THE REFINER AND NATURAL GASOLINE MANUFACTURER

In This Issue

Power Costs reduced by Electric Drive. Big saving being effected through use of Turbo Generators. Methods of installation and operation.

Flexibility Gained in Invincible Plant. Commercial fuel oil and Gasoline that needs no blending are features of Carlton-Ellis process.

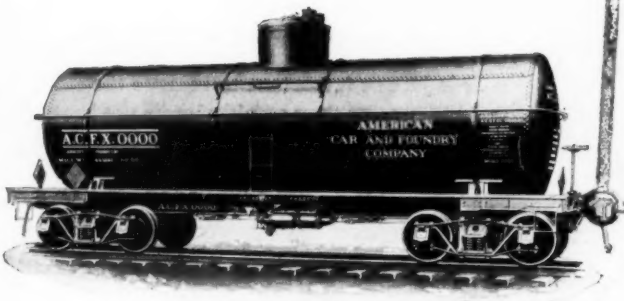
How to Treat Discolored Gasoline. Lubrication of engines is often the cause.

Plant Men Gain Knowledge at Drumright. Care of Magnetos, Treatment of water, pumps and baffles among subjects discussed.

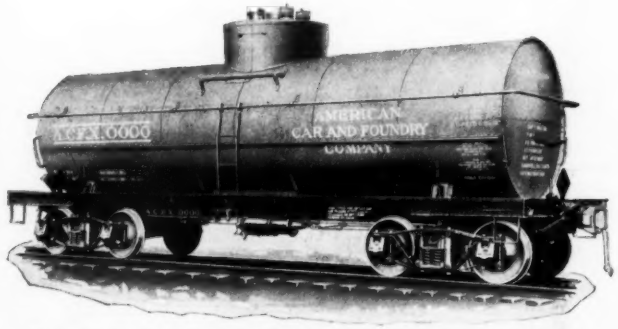
Vol. 3 No. 8 Aug. 1924 $1.00 Per Fear

Tank Cars

for All Purposes



Class III Car for general service. Embodies all the latest improvements and exceeds the A. R. A. requirements.



Class IV Car for natural (casinghead) gasoline. Properly applied insulation reduces outages to minimum.

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STANDARD OIL COMPANY
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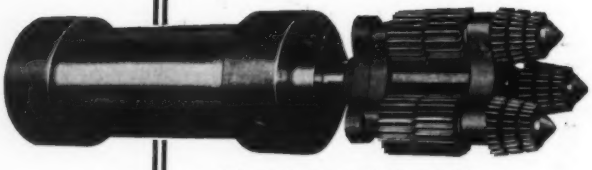
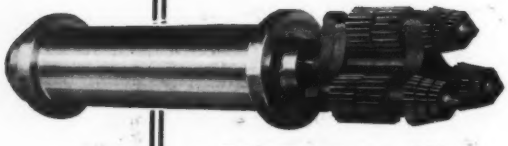
LIBERTY

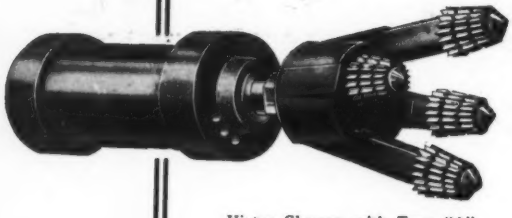
Cleaners for the Oil Refinery



Victor Cleaner, with Type "SF" No-rivet Head



Tandemtype Cleaner, with Type "SF" No-rivet Head



Victor Cleaner, with Type "A" No-rivet Head

The oil refineries have found it absolutely necessary to clean the different encrustations which form in the tubes of pressure stills, in down-take pipes, tar-lines, and cracking coils. Liberty Cleaners for such service are in use from 3¼-inch up to 10-inch sizes.

For cleaning the hard coke deposits which form in some of these tubes, we have developed a particularly sturdy cutting head in the Type "SF". This head combines the utmost simplicity with ruggedness of construction, greatly reducing maintenance costs. Our double or Tandem-type motor, equipped with the "SF" head, will clean the hardest deposits from any tube.

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Write for our Catalog Z-1, and we will gladly furnish complete information regarding Cleaners for your particular problems.

Liberty Manufacturing Co.
449 Grant St.
PITTSBURGH, PA.

Z-991

CLEANERS

Entered as second class matter June 16th, 1923, at the Postoffice at Houston, Texas, under the Act of March 3, 1879.

The Logical Gas Engine-Compressor *for any plant* is that built by HOPE

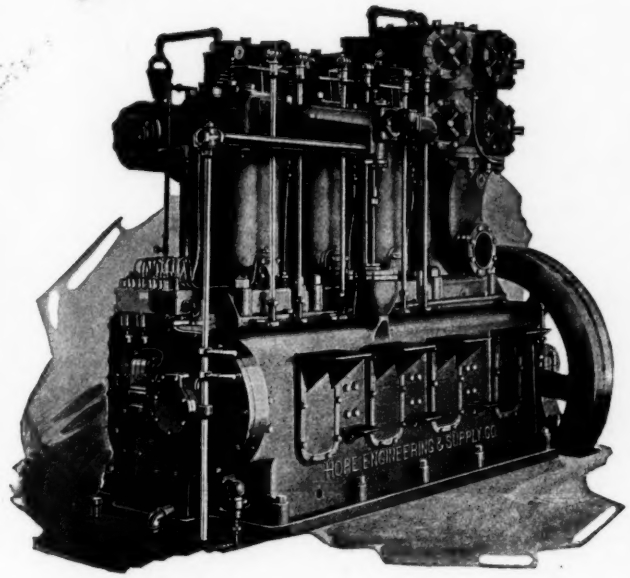
Vertical Type

The day of blind adherance to precedent is past. Today you must think of equipment in terms of its efficiency and service ability, first. You do not seek a single cylinder automobile because it once was the best thing going. You buy a car with a balanced six-cylinder motor.

Look at gas engines in the same way. Hope developed the highly efficient VERTICAL type because it is the logical improvement over earlier models. The running balance, the lower frictional losses and longer life of maintained high efficiency, give it many positive points of preference. Modern ideas in engineering are all in favor of smaller power units operating at higher speeds. They have proven more efficient.

Unit construction of gas engine and compressor is fundamental with Hope. Maximum capacity for the power input is achieved through the use of the patented Hope Biplane Valve. This improved plate valve is of a design which has unusually ample port area, and operating characteristics which set a high mark for efficient compression. Hope high-speed compressor efficiency invites comparison.

Look at it any way you will, the Hope Vertical Gas Engine-Compressor is the logical choice in these modern days.



Our engineers will welcome an opportunity to discuss economies with yours.

Other Advantages

Smaller foundation and smaller building cost. Lighter unit costing less for transportation. Shipped assembled, and easily erected. Easy to start and inexpensive to operate. Requires little attention and no tinkering. High overall efficiency throughout its life.

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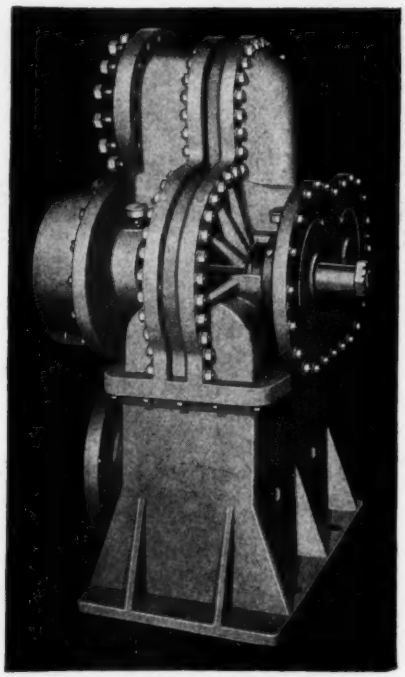

New Pumping History

NORTHERN ROTARY PUMPS
"MORE GALLONS PER HORSE POWER"

Two pumps like that pictured above, have been hustling oil into Tankers for a Pacific Coast oil Co. during the last year; and engineers in charge of the job have given them an over all efficiency rating unheard of in pumping history—as high as 90%!

These pumps have loaded tankers at a tremendous saving of time—and that means money—and of power, which means money, too.

They have held the pace twenty-two hours a day, steady, sturdy, reliable. They have the pump qualities that pump users have longed for but never before attained.

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ROTARY NORTHERN PUMPS

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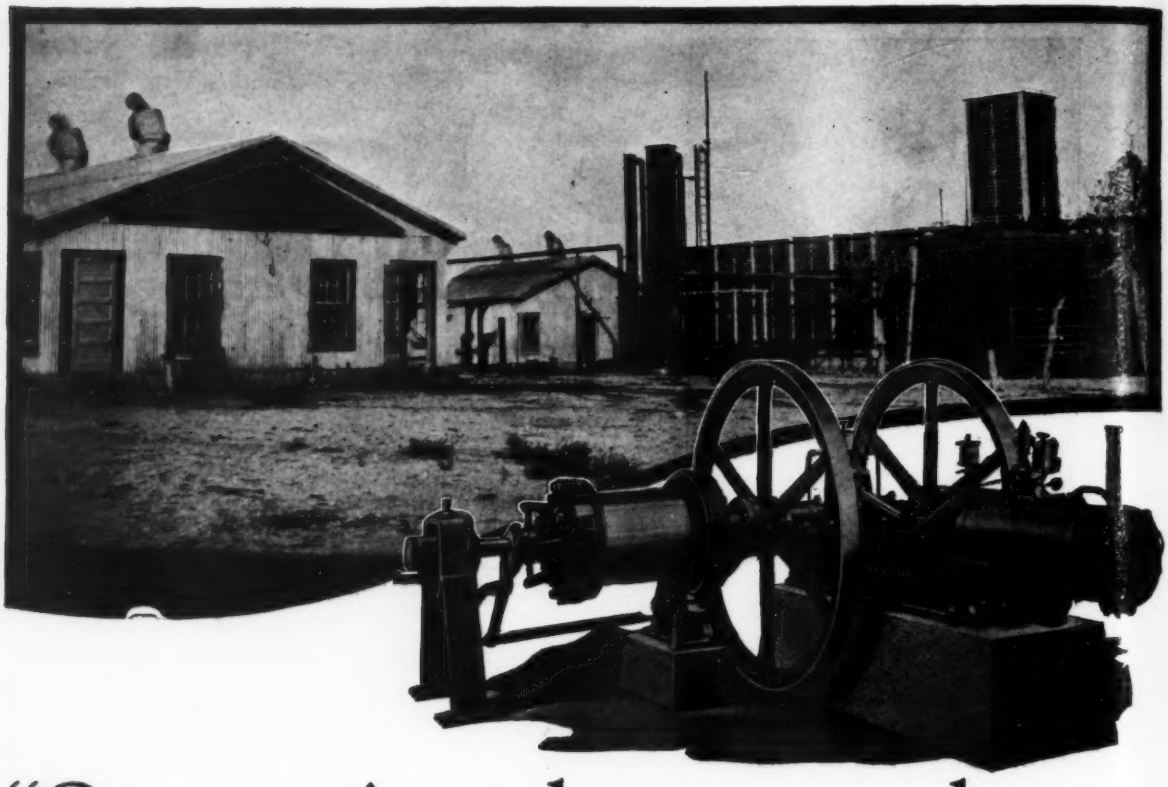

"Our engines have sure been 'balling the Jack'!"

said a typical Bessemer operator in Arkansas the other day to a tenderfoot visitor from the East and the eastern man had to ask further questions in order to learn that *'balling the Jack'* is a term of high praise.

The comment is typical.

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THE Absorption Plant handling the largest volume of gas in the mid-continent field is equipped with Sterling Oil Condensing Sections exclusively.

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The first Charcoal Recovery Absorption Plant in the mid-continent field is equipped with Sterling Oil Condensing Sections exclusively.

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Sterling Oil Condensing Sections as they are assembled in stacks in Condenser box.

Let one of our engineers call and tell you about Sterling Sections. Send to any address below for booklet describing them.

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AMERICAN RADIATOR COMPANY

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Sterling Condensing Sections are immediately available at our plants in
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STANDARD OIL COMPANY
EL SEGUNDO, CAL.

Fair Play As It Is Down in Louisiana

Gasoline inspection pays a handsome profit, which is used to defray inspection of food and drugs

Baton Rouge, La.—This really is just a question of fair play. It happens to be the matter of gasoline inspection in Louisiana. It is one of the conditions the oil industry might set up in its proposed campaign of educating the people of the United States to the point of holding the proper idea of the whole of the petroleum industry.

Really it should be told through the daily press. For the American citizen believes in a square deal. When a state collects money for inspecting gasoline and takes the proceeds of that inspection to defray the expense of inspecting food and drugs, fair play no longer exists. That is the condition in Louisiana.

The whole truth is that there is no more need for the inspection of gasoline and kerosene than there is for the inspection of bustles. Refiners quit leaving the highly volatile products in their kerosene along about the time the bustle went to the attic and women took the road of apparel that has arrived at the one piece bathing suit.

Figures Talk

Figures usually make dry reading. But when the refiners of a State pay $429,212.66 for inspection in four years, the total becomes respectable. Records in the office of the Supervisor of Public Accounts further show that gasoline and kerosene inspection cost but $143,779.37 in the four years. So the figures take on a degree of interest because they reveal a profit of $265,433.29 to the State Board of Public Health.

Now this is not a hint at graft. The Board of Public Health has been managed efficiently. But efficiency can not hide injustice, which looms large when the records of the expenditure are further examined.

During the four years, ending with 1923, the Board of Public Health spent $154,124.98 for inspecting food in Louisana and in the same period spent $100,261.51 for inspecting medicine Along with spending this $254,386.49 the state collected but $2,766.54.

So the profit from the useless inspection of petroleum products in Louisiana went to defray the expense of the proper inspection of food and medicine. While it is necessary to get funds to carry on food and drug inspection, it is poor sportsmanship to get it by charging an exorbitant rate for performing a useless act.

That the inspection of petroleum products is accepted as a source of revenue for other duties of the State Board of Helath is the conclusion to be drawn from events that followed the introduction of a measure in the recent session of the Louisiana General Assembly, the purpose being to reduce the petroleum inspection fee from one-eighth to one-twenty-fourth of a cent a gallon.

The measure got as far as the committee room, where he hung on a rock in the shape of a tie and failed to make the deeper water of a vote on the floor. But friends of the Board of Public Health went before that committee and admitted that a reduction in the fee on gasoline inspection would compel the board to ask for an appropriation to carry on the other duties of the board.

Politics Again

The office holder fears the appropriation. It is the one thing he dreads when it comes time to seek votes again. So it was the expected thing that the Louisiana legislators left the Board of Public Health to get its operating funds from gasoline inspection and escaped the duty of voting an appropriation. So the good old American square deal took another jolt on the jaw, as the measure hung fire in the committee room.

Further proof that the inspection of gasoline in Louisiana is but a perfunctory bit of routine can be drawn from the methods of inspection.

Inspection of petroleum products in Louisiana dates back to 1877, when there was need for it, for the unscrupulous refiner might then have left worthless gasoline in valuable kerosene. It applied then only to Orleans Parish and remained unchanged for many years. The fee was one-fourth of one cent a gallon and remained at that figure until some refiners declined to pay the amount, after refining had become general in Louisiana and inspection fees promised to mount to high totals.

With the threat, the Board of Public Health previously having been given the inspection duty, a compromise was reached of one-eighth of one cent a gallon with the understanding that an amendment would be offered making the legal fee one-eighth. That amendment became a law July 10, 1918. It then became the practice to make the inspection at the refineries.

Such Hard Work

For evidence of the fact that the inspection is not taken seriously by the authorities, here are excerpts from letters written to refiners at that time:

"I shall leave at the refinery a number of signed labels both for gasoline and kerosene.

"You will see that all tank cars containing gasoline, naphtha, and benzine, to be shipped to points in the State, are labeled on each end of the car."

These excerpts tell the truth of inspection of petroleum products at many Louisiana refineries. The labels are left and they are put on the tank cars as they leave the plant.

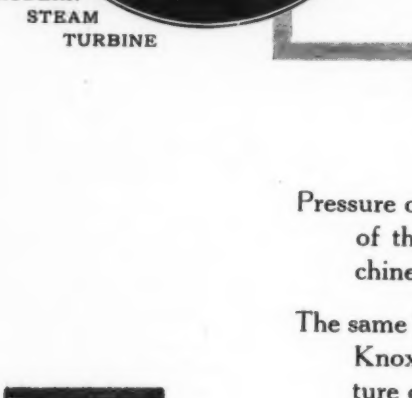
Now the inspector may take a sample from the tank cars and he may not. There are plants where an inspector is not seen more than once a week. Then he comes along and draws a few samples and is on his way for perhaps another week.

Louisiana is not the only state where the petroleum industry is loaded up with a usual expense of inspection. It is just an instance of where the oil industry does not get a square deal and where the users of gasoline do not know the truth.

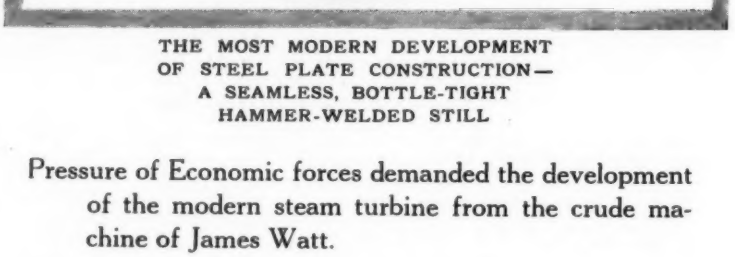
Like all taxes and fees, the cost of the inspection in Louisiana comes from the pockets of those who buy gasoline. The inspection fee is a part of the manufacturing cost. It must be considered just as fuel or depreciation.

Pressure of Economic Forces

WATT'S ORIGINAL STEAM ENGINE 1774



MODERN STEAM TURBINE



THE MOST MODERN DEVELOPMENT OF STEEL PLATE CONSTRUCTION— A SEAMLESS, BOTTLE-TIGHT HAMMER-WELDED STILL

Pressure of Economic forces demanded the development of the modern steam turbine from the crude machine of James Watt.

The same forces demanded the development of the Blaw Knox Hammer Welding Process for the manufacture of tanks, oil cracking stills, autoclaves, etc.

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STEEL FORMS For Concrete Construction
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BLAW-KNOX FORGE AND HAMMER WELDING

Power Costs Reduced by Electric Drive

Some refiners effect big saving by use of Turbo Generators. Method of installation and operation

By Harry Pennington
Mechanical Engineer

THIS discussion covers the application of steam turbine driven generators to refinery work in such way that the steam is given superheat in the boilers, put through the turbine, where power is skimmed from it, and the steam is reduced in pressure, then passed out into the header supplying stills with naked steam for distillation purposes.

The subject matter and the arrangement is not original with the writer; the same arrangement has been used for years in other industries, notably the paper industry, except that superheat is not a requirement for that purpose, but where large quantities of steam are used for process work, and such steam is furnished through steam turbines of either the non-condensing type or the extraction or "bleeder" type, running condensing with vacuum on the stages lower than the bleeder.

Several refineries have been using this arrangement for some time; one turbo-generators of 1000 kilowatt hours per hour capacity each, that has operated for years with results pleasing and satisfactory to the management. Other installations in sizes from 300 to 2000 kilowatt have also been in successful operation for years with equally successful results.

Suitable for Any Plant

Any class of plant, skimming or complete, asphalt or paraffin base oils, may reduce its boiler horsepower materially and at the same time produce an excess of power required for the refinery. And the absorption gasoline plant also may be treated in the same manner, since it uses steam within stills, but in these, steam is generated from residue gas and fuel is not an item of expense, usually.

Where the quantity of steam required is large for process work, as in plants running down to flux or making cylinder stocks, the surplus power obtainable is very large, compared to the requirements of the refinery, and such surplus of power may be used elsewhere.

However, this discussion is not to advocate any refinery going into the power business, except as a means of furnishing power for its own and allied company requirements, because consumers of power are strict in demand requirements, but is rather to make the refining operation as profitable and complete within itself as possible and to eliminate the unnecessary installation of boilers and the use of fuel under them.

The subject is such that perhaps an outline of principles underlying would assist in going deeper into the details.

Underlying Principles

Steam engineering and the thermodynamics of steam generation, coupled with refining of oil, is at once an intricate subject; the latter is more variable than the former, due to the many grades of crude oil refined, the many products that each oil produces and the various processes and methods of refining each product. A volume would be required to set out the maze of processes, general and special, that are used; there are, however, certain general refining operations that are common to all refineries, and one of these is the application of steam to oil in the still under distillation.

The arrangement for application within the still as to piping, the pressure, quality and quantity of naked steam introduced into the oil varies also, greatly with the oil being taken off overhead and with the individual refiner, and this phase can be taken up only in a general manner. Certain of these factors are taken on an average basis, instead of separating into quantities of steam used for each product being taken off.

Steam engineering, on the other hand, deals with water and heat and mechanical appliances for evaporation; the principles have been worked out in a large way to infinite detail and exactness, and there is no necessity for being general as to this phase, because steam generating pressures and the behaviour of steam is always the same under the same conditions.

Steam, as produced in the average boiler, with fair feed water and no superheater, passes from the boiler nozzle with an appreciable quantity of entrained moisture; commercially dry steam includes not over 2 per cent of moisture.

Moisture is difficult to keep out of steam that is not superheated. When steam is generated from water, the water surface, termed liberating surface, emits little jets of steam, miniature water spouts, each of which liberates steam. In a laboratory test boiler, a Sterling, of about 100 horsepower, with heavy glass covered peep holes, arranged to inspect the water surface while steam is being generated under pressure, studied by the writer, many interesting things occurred. The steam, being invisible, was not in the way. When steam was being taken from the boiler at an average rate, the little jets assumed average proportions; when a valve was opened quickly, making a heavy draft upon the steam, the jets spurted up high, and the steam entrained more moisture. When the water level is carried high, the jets spurt higher also and, when temperature of the boiler is falling, more moisture is entrained.

When these facts are used in everyday steam generation for refining use, and trouble is had with moisture anyway, then we may look elsewhere; feedwater may have too large salt content, or the boiler may need washing.

Then, steam as generated always carries out of the boiler with it a small percentage of moisture. Two per cent of moisture carried into the still with steam would prove a source of trouble. That dry steam goes into the still may be seen from the following:

Develops Superheat

When steam is expanded without doing work, a certain amount of superheat is developed, corresponding to the difference in temperature per pound at the initial and final pressures, less a small loss. This can perhaps be stated in another way; when steam enters an engine and does work, condensation takes place, due to cooling. Part of the cooling is from contact with cylinder wall, but the steam is cooled also by doing work, since heat is interchangeable with work, and some of the heat of the steam has been converted into work. Consequently the engine exhaust steam is very wet.

Expanding steam through a nozzle does no appreciable work, unless, of course, the nozzle is placed so as to do some work.

And when the valve is cracked from the steam header into the still, expansion produces some superheat, provided there is not sufficient moisture in the steam to absorb such superheat by evaporating such moisture into steam. In the presence of superheat, moisture flashes into steam, and, if sufficient

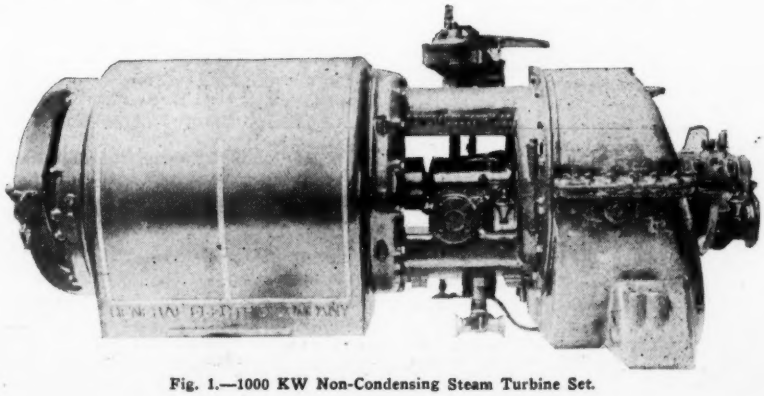

Fig. 1.—1000 KW Non-Condensing Steam Turbine Set.

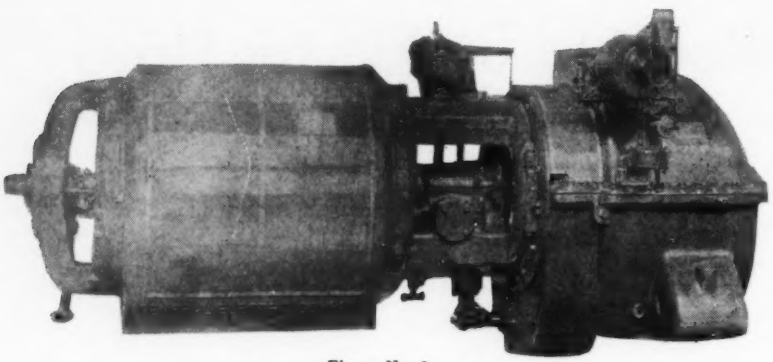

Figure No. 2
750 R P M Extraction type Curtis Steam Turbine Set

moisture in steam has been evaporated to reduce the steam temperature to the saturation point, then any additional moisture passes with steam into the still and causes the oil to foam and belch over into the tower or condenser.

Then, as a prerequisite, for injection into stills, steam must be dry, and to insure dryness, some superheat, however little, must be present all the time for safe work.

The quality of steam going into a still over a 24 hour period will vary appreciably in superheat, as may be determined by tests; a variable load on the boilers, and particularly a peak load, or lowering or raising boiler pressure by poor firing, or heavy drafts of steam, with a corresponding raising or lowering of boiler temperature, all reflect in a variation of moisture content. And, such moisture requiring superheat to evaporate it, a variation in moisture of still steam causes a variation in the quantity of superheat generated by expansion into the still steam header and then into the still.

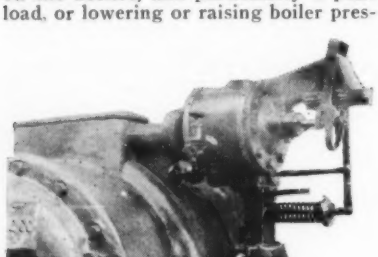

Figure No. 3
Automatic Extraction Device

The purpose of steam in a still is manifold, as we know; mechanically, steam accelerates circulation of oil within the still, when the piping is properly arranged, causing the oil to sweep the interior still surface, and free vapor bubbles as formed; circulation holds coke in suspension until it passes out; stirs up embryonic coke, keeping it in solution; mixes with oil vapors and carries them to the oil surface for liberation and reduces the distillation temperature, all of which are mechanical effects.

If moisture has not been flashed into steam by the superheat of the steam, then the heat of the oil will flash it into steam inside of the still, increasing its volume hundreds of times, with ensuing distillation difficulty.

Stills, as we see, have always been furnished with steam with some superheat, and since such superheat varies, such variation in temperature has no appreciable effect upon distillation, other than to increase the volume of steam. Of course, when steam is highly superheated, some assistance is had in distillation due to temperature, particularly when handling light oils.

The volume of steam increases with temperature like any other vapor. Any steam table shows increase in volume with superheat, constant pressure.

The temperature of saturated steam at 150 pounds gauge pressure is 364 F., and at three pounds gauge, 221 F. Steam at either pressure may have superheat; ordinary pump exhaust steam may be passed through a separately fired superheater and given the same quantity of superheat that live steam can have given to it by a superheater within the boiler setting.

Having set up a marker for steam for still use, we pass to the steam driven turbo-generator. Turbines of certain types may be arranged with proper steam inlet pressure and temperature of steam, and with correct number of stages and blading arrangement, to deliver steam from the exhaust with a large percentage of initial superheat remaining, making it perfectly dry, and sufficient back pressure may be carried upon the turbine exhaust to make the exhaust steam usable in the still. This is one arrangement, applicable where the quantity of still steam required is large, as in refineries running down to heavy lubricants, taken off overhead and all of the exhaust steam may be used within stills. The other arrangement consists in using a turbine with bleeders for taking steam out after it has passed through higher pressure stages of the turbine, the remainder of steam passing on through the remaining stages, which may run condensing for economy. Steam bleeders may be placed in any stage of the turbine, to secure steam of proper pressure and temperature, since each successive stage contains steam of successively lower pressure.

To secure dry steam from the non-condensing turbine exhause the boiler must deliver steam with some superheat and for this purpose, superheaters within the boiler setting may be used.

Aside from still requirements, superheated steam affords other economies; the efficiency of any prime mover using steam is proportional ot the range of temperature within the prime mover. Thus, if an engine or a duplex pump takes in steam at 464 degrees F. and exhausts to atmosphere, the economy is greater than if steam were admitted at 364 F. and exhausted against the same pressure; greater by numerically the same ratio of temperatures.

But, with the methods herein outlined, the economy of the prime mover, the turbine, is not the controlling factor, although the economy is of importance.

The turbine so arranged may have one or more stages, depending upon the quality of exhaust desired. And, when properly arranged, exhaust steam that is bone dry may be secured continuously. Fig. 1 shows a single stage non-condensing turbine of the Curtis type, driving generator.[1] Fig. 2 shows another type of Curtis turbine of the extraction type, and Fig. 3, the steam extraction device, or bleeder, which automatically maintains a constant pressure of extracted steam on the steam line, and Fig. 4 shows the steam extraction device with remote control.

Compared with multi-stage condensing turbine, the economy of a non-condensing turbine is low; but, compared with the economy of direct acting pumps, the non-condensing turbine delivers electrical power with a steam consumption of about one-third as much. The accompanying curve of Fig. 5 discloses the approximate economy of turbines from 500 to 1000 kw., running at 150 pounds gauge pressure, 150 degrees superheat, and 20 pounds back pressure.

Due to superheat, the economy is better, but back pressure increases steam consumption; the steam consumption curve is remarkably low, considering the running conditions of back pressure.

The economy of the bleeder type of turbine varies with bleeder steam requirements and with vacuum carried on the exhaust; no curves of this are given, because the application of this type is variable. However, generally speaking, where the non-condensing turbine furnishes too much steam, which is seldom, the bleeder type, condensing may suit requirements better, since it possesses much flexibility and may be ar-

[1]Courtesy General Electric Co., Turbine Department.

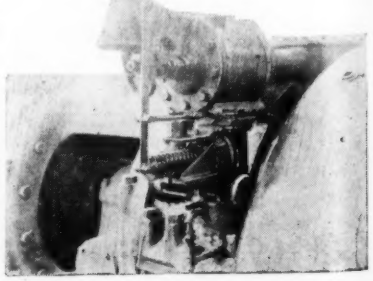

Figure No. 4
Automatic Extraction Device Equipped with Remore Control

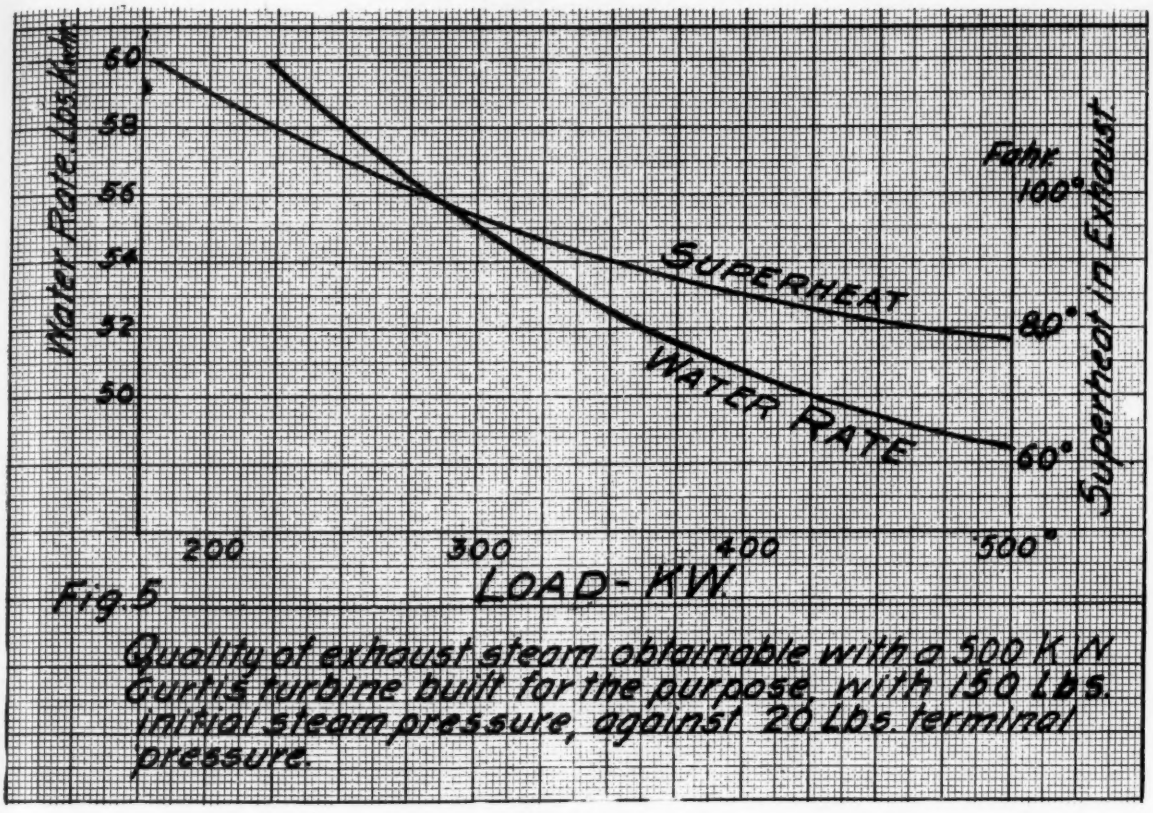

Figure No. 5

ranged to suit any practicable working condition.

Taking a specific instance: a 10,000 barrel plant, skimming off 56 per cent of light oils, or 9786 gallons of distillate per hour. Averaging two and one-half pounds of water per gallon of distillate, 24,465 pounds per hour of water passes through the stills.

When this quantity of steam is generated at 150 pounds pressure and 150 degrees superheat, it will pass through a turbine and make 500 kilowatt hours per hour of electric power, yet such steam will emerge and still be perfectly dry and suitable for injection into stills. The superheat remaining in such steam can be seen from Fig. 5 to be such that this value is much higher than ordinary boiler steam reduced through a valve.

There are two ways of estimating the value of this. Five hundred kilowatt hours per hour of electric power, at two cents is $240.00 per day, which may be considered as a by-product, is one way.

When steam is used for direct acting pumps, and for engines, the steam consumption in a 10,000 barrel plant, for this purpose would be about 24,000 pounds per hour, not including boiler feed pumps, assuming a water rate of 150 pounds per water horsepower for the direct acting pumps.

Were these pumps electric driven, from the turbo-generator, as outlined in preceding paragraphs, the steam necessary for driving direct acting pumps is not required, and the boilers to that extent might be shut down, and all operations proceed more regularly than before.

With no steam requirements for pumps, as shown, and allowing a boiler efficiency equalling 11 pounds of steam per pound of fuel, the fuel used by boilers furnishing steam for pumps, is seven barrels per hour, and the elimination of this quantiy of fuel, based on the Mid-Continent at the refinery market, amounts to about $50,000 per year, while, at tidewater, the annual difference in favor of turbo-generators is more than $85,000.

In addition, the turbo-generator will furnish about 375 kilowatt hours per hour of electrical energy, over and above refinery requirements, which, if used for field operations, or other purposes and credited to the refinery at two cents per kilowatt hour, is an additional earning for the refinery of $65,700 per year. Adding the previous $50,000 to this, the gross annual difference is $115,700 for an interior refinery and $150,700 for a tidewater plant. And these figures are not fancy, either; this has been worked out in practice and owners of refineries so equipped and operated are much pleased with the entire operation.

The cost of equipment for doing this is much less than the annual operating cost difference and the equipment lasts for years; turbo-generator plants designed by the writer twelve to sixteen years ago are still in every day satisfactory operation.

But, skimming plants may be classed as dry distillation, since the steam used is held to a minimum in favor of securing as large percentage of light oil as possible from crude charged.

Plants running lubricants, on the other hand, use larger quantities of steam to prevent cracking and consequent reduction of viscosity; and in this type of plant, the steam used for pumps is a minor quantity, compared to the quantity necessary for injection into stills. When making the highest grade of cylinder stocks, the quantity of steam may run as high as 35 pounds per gallon of distillate.

The proportion of boilers to plant capacity may run one boiler horsepower per two and one-half barrels per day charged, so that a 10,000 barrel plant requires about 4000 boiler horsepower.

It must be remembered that this capacity of boilers is based upon 100 per cent boiler load; while many plants have less boiler horsepower, the general practice is to run water tube boilers at over-load ratings. Many plants, with high settings of boilers, run continuously at 150 per cent load; some maintain 200 per cent load, and with little reduction in efficiency. So, in considering boiler horsepower, the matter is handled, not in square feet of heating surface, but in pounds of steam delivered at the boiler nozzle. However, factors of evaporation are not included; this makes a slight difference, but for the purpose of this discussion this is omitted for simplicity.

The complete plant, running paraffin base oil, making lubricants overhead, as well as cylinder stocks, when not running down to flux, requires an increased amount of steam as shown, not

only to prevent cracking effects, but also because a greater percentage of distillates is taken off. And, for the purpose of this paper, the writer will assume that when running down to flux, the quantity of steam per gallon of distillate will average 5 pounds per gallon of distillate, and that 80 per cent is distilled and condensed overhead. The distillation rate and percentage then will produce 14,000 gallons of distillates per hour, and at the proportion of 5 pounds of water per gallon 70,000 pounds of steam per hour is required.

The proportion of five pounds per hour, as is noted, is double that of a skimming plant. While the lighter oils require not much more steam in a lubricating plant than in a skimming plant, the heavier require much more; the distribution is not given, since it is subject to much variation, not only to suit the oil, but with the gravity of oil being vaporized and distilled.

And the same quantity of steam is assumed, whether running down to flux, or whether stopping at a proper point to make cylinder stock.

Fourteen thousand gallons of distillate per hour at 5 pounds water rate, totals 70,000 pounds of steam per hour, or about 2300 boiler horsepower, for furnishing steam for stills.

When direct acting pumps are used for transferring oil within the refinery, the steam requirements for this purpose would run about 30,000 pounds per hour, assuming the same water rate of 150 pounds per hour for direct acting pumps, and the boiler horsepower necessary for steam pumping is about 1000.

However, many plants of the size named have turbo-generators running condensing for furnishing power to outlying pumps and for other operations. The steam consumption in such plants would not run of course as high as in a plant where all pumps were direct acting steam driven. The modifications of this arrangement are not included, however; but by way of explanation, the fuel used in a plant so arranged is not as large as outlined herein. But, the fuel and steam used for running turbo-generators condensing is not a necessary item, and it is the elimination of this steam and fuel that is the object of this discussion.

Now, since 70,000 pounds of steam per hour is required for stills, if this steam is passed through a turbine after being superheated, it will produce about 1500 kilowatt hours of electrical energy per hour, as a by-product obtained when reducing from boiler pressure to still header pressure.

And, using this power instead of direct acting steam driven power, there is made unnecessary the 30,000 pounds of steam per hour required for pumps, which at the same rate of 11 pounds of water evaporated in the boiler per pound of fuel, means 2727 pounds of fuel oil per hour less, or at an annual difference in operating cost of about $61,000.

In addition to furnishing all the power necessary for refining, as shown, the turbo-generator will have produced about 1000 kilowatt hours per hour of additional surplus electrical energy, which may be used for field purposes or elsewhere, and when credited to the refinery at two cents per kilowatt hour, makes a further total of $175,200 per year, and the gross annual difference of operation is $236,000 in favor of turbo-generator operation. At tidewater, the total difference, based on the tidewater fuel oil market, is $278,000, in favor of turbo-generators.

The capital cost of equipment for doing this is far less than the annual difference. As a matter of fact, the cost of additional boiler capacity necessary without turbo-generator-superheated-steam-exhaust will go a long way toward offsetting the cost of such turbo-generators because the boiler capacity is reduced by just the amount of steam that is used for other purposes than stills and for heating oils for agitators and filters.

Of course, when electrical energy is purchased from an outside source and used for pumping instead of direct acting pumps, the difference in cost of power is large and it would appear that that method is good; but, compared to the method outlined herein, an amount of money is lost every day equalling the amount of money paid for power purchased from an outside source—just that much, no more and no less, because such power may be produced within the refinery as a by-product. And, where power is purchased from an outside source, the refinery necessarily must have power generating equipment of its own sufficient to keep the plant in operation should electric energy from an outside source fail; the capacity of such auxiliary power generating equipment need not be all that is necessary for operation, however, but the refinery must have a continuous power source to prevent interruption of oil charging rates and other operations that must be carried on continuously. And then, to the cost of purchased power must be added the fixed charges and other costs incidental to the maintenance of such auxiliary equipment.

Having outlined the production of electrical energy, while furnishing steam for stills, we come to the utilization of such energy in the refinery.

The principal objection to electric motors in a refinery are, of course, electric sparks and the presence of heavy vapors. While these do exist around the stills and agitators, even so, there is no necessity for setting all pumps directly where such vapors may reach them. And, since alternating current motors of the squirrel cage type, have no brushes, there is no sparking as when direct current motors are used. In any event, wherever pumps are placed, it is possible to completely inclose the motor, with air ducts leading away a distance and then up into the air fifty, or a hundred feet, so that there is no more danger from sparking inside of a motor or even the motor burning out than there is from fire inside of the still furnace or vapors inside of the still. And an additional precaution may be taken to set pumps on one side of a sheet metal firewall and the motors on the other side and using inclosed, oil submerged switches. The shaft leading to the pump for driving may be fitted with a light stuffing box where it passes through the wall. With a pump house so arranged, there need be no fear whatever of sparks setting vapors afire.

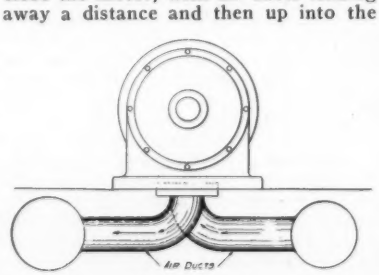

Figure No. 6

Enclosed Electric Motor with Ventilating Air Ducts

In pipe line work, using oil engines for operating line pumps, the same construction is followed by several companies. In this class of work, however, the engine exhaust pipes are sufficiently hot to ignite almost any oil and, should a fitting crack, or a stuffing box leak and spray oil where it may reach the hot exhaust pipe, an explosion would occur; the writer has been within fifty feet of such an accident in the field, looking at this very feature, but in a pump station in which he had only a general interest in the engineering design employed.

This danger is not present in the refinery; with improved wiring appliances, such as conduits running under ground, vapor proof lamps, approved by the Underwriters Laboratories, we use electricity every day and night without thought of danger, and motors may be also arranged; the arrangement of gas tight air ducts to the motors for cooling, however, is safer than a vapor proof fixture. The writer believes that this design of motor is original; motors require an air circulation through the motor and windings for cooling, and a fan is usually built into the motor to accelerate such circulation. With the design as outlined, this fan may circulate air from a point fifty feet up in the air down through the motor and back 50 feet up in the air, and at a distance away from the motor room, the several motors leading into a common duct for air intake and exit. Fig. 6 shows the arrangement of such air ducts, which is similar to the ducts used for the generators of steam turbine sets.

Electric motor drive for refineries is an ideal drive, from a power distribution standpoint. Pumps so operated will pump a tank empty and then not run away; they may be distant controlled; pressures may be controlled evenly; discharge capacities may be regulated accurately and maintained at a very uniform rate which is not possible with steam driven pumps. Condensation in long steam lines is eliminated entirely and pump cylinder lubrication troubles from wet steam are not present. The pump houses are cleaner, neater and conduce to better operation when in this condition.

In addition to steam for stills, the exhaust steam, as shown in curve of Fig. 5, at 20 pounds pressure and about 80 degrees of superheat, having a temperature of about 320 degrees F., is entirely suitable for all process work of filtering, and heating kettle jackets.

There is still another use for superheated steam that is generally employed in refining vegetable oil, not by

(Continued on page 32)

Plant Men Gain Knowledge at Drumright

Care of magnetos, treatment of water, pumps and baffles among topics of meeting

By W. Lee Sloan

Tulsa, Okla.—The second regional meeting of plant operators of the natural gasoline industry, held July 17 at Drumright under the auspices of the Association of Natural Gasoline Manufacturers, drew 120 plant operators, representatives of supply dealers and executives.

The meeting was called to order by W. A. Melton, of the natural gasoline division of the Liquified Petroleum Gas Company of Tulsa. After a formal introduction of himself, he requested each operator to rise to the floor of the convention and announce his name and his company affiliations.

A. V. Bourque, secretary of the Association of Natural Gasoline Manufacturers, made a short address of welcome to the men present. Bourque gave a short history of the association in which he told of the many accomplishments of the organization, the desire to co-operate with the field men, the aims of the association and its purpose and place in the manufacture of natural gasoline.

R. R. Owens of the Marland Refining Company of Ponca City, referred to as the "Father of the regional meetings," was introduced by the chairman. Owens expressed his idea of the educational value of the meetings and gave a report of proceedings of the Tonkawa meeting which was held some time ago. His idea of a plant library in which would be placed a copy of all trade journals and other reading matter pertaining to the industry, was accepted with much enthusiasm.

The chairman next introduced W. O. Prescott of the Drumright Ignition and Repair Company who made an address on the "Care of Magnetos."

Here are some of the reasons given by Prescott for defective magnetos:

Using bastard parts.
Excess oiling.
Inferior windings.
Untrue spacing of points.
Ignorance of the purpose of repair to each part.
Using wrong grade of oils.

A general discussion of magnetos followed Prescott's address in which he answered many questions of importance to the operators.

Mr. Nelson of the Roxana Petroleum Company. "How often should a magneto be oiled?"

Prescott—"About every two weeks."

Nelson—"What kind of oil should be used in oiling?"

Prescott—"I have found Winchester oil very good, however, we use in our plant, petroleum jelly with graphite."

Nelson—"Is it advisable to use platinum files?"

Prescott—"Not if the man is inefficient in using the file."

Nelson—"Is it advisable to dip a magneto in gasoline?"

Prescott—"No. Gasoline will cut the insulation."

Things to Know

Prescott explained that many operators thought that when they had a light gray color on the points of the magneto, it was in need of filing, but he explained that this was the one time in the life of a magneto when it was functioning best.

Repair men should know the following things before attempting to make adjustments on magnetos:

The tightening of screws is imperative for efficient work.

The knowledge of the right tools in repair.

Do not attempt to make repairs to parts which you are not familiar with.

A. J. Schlosser, Barnsdall Oil Co.—"What limit of compression should be applied to a Wico Magneto?"

Prescott—"I can not answer your question, but I will say that the Wico will work best on a two cycle engine instead of a four cycle. Speed is more necessary than compression for the spark will not jump well under compression as it will as when engine is open."

W. A. Melton, the chairman, made a few remarks in regard to magnetos, saying that the points should not be filed too often, the continued corroding of same is indicative of the fact that there is something vitally wrong with the magneto and not the points. His idea of a good file is a corset stave with a rubber band pulled tightly over it.

"Would you reduce speed of magneto below the specified speed to fit the individual case?"

"No. The manufacturer knows more about magnetos than the layman, so accept his specifications."

At this point the session was interrupted by a painter, nailing a sign up on one of the walls of the meeting building. The chairman was emphatic in his criticism of the interruption and asked the painter to come to the platform and explain his action.

After finishing the work of putting up the sign, on which was inscribed the word "Loyalty", the painter made a short talk to the operators on loyalty to the organizations for which they worked.

The painter proved to be "Shorty" McKaye of the Marland Refining Company, the man who has charge of painting the filling stations of that organization. "Shorty" was discovered as a public speaker during a meeting of the employees of the Marland company some time ago, when he delivered his famous speech on "Loyalty" before the executives of his company.

Water Treatment

George M. Massen, district manager of the Dearborn Chemical Company of Kansas City, read a paper on "Water Treatment", explaining the different natural chemicals which make water a difficult problem in plant operation. In the paper, Massen outlined the different treatments for water and explained the necessity of the treatment for use in boilers and other uses around the plant.

In the general discussion which followed the paper, Massen answered the following questions:

"Why can't cooling water be used after it has been treated?"

"Noncrustating solids are not generally removed."

"Would it be better to precipitate the elements out or to use chemicals in water to convert the substance?"

"It is better to use chemicals to dissolve the solids."

"How often should a boiler be 'blown down'?"

"At regular intervals or your boiler will corrode."

"What do you think about putting crude oil in a boiler?"

"This is all right I suppose, but I have never been able to figure out why it is done unless it has a penetrating effect like it will have on a rusty nut or tap."

"What do you think of treating the metal before using?"

"There is no such thing as metal treatment. Paints and other compounds will not keep the parts from corroding."

Talk On Pumps

A. J. Schlosser, Barnsdall Oil Company, opened the afternoon session of the meeting by delivering an address on "The Methods of Oil Circulation". In a discussion of the different methods of oil circulation, Schlosser outlined the forms as: The steam pump, the depositive action pump, the centrifugal pump and the rotary depositive pump. In commenting on each type he explained that the steam pump had too much packing which caused fluctuation, the depositive pump as being irregular in speed, the rotary depositive pump as being too complicated. He was much in favor of the centrifugal pump and gave many good qualities of its performance. The location of the tanks should be placed in order that the oil will gravity to the pumps is an opinion of the speaker. He also remarked that oil of light viscosity would "gum" up the pumps.

Baffles Explained

For the closing address of the afternoon session, Dean E. Foster, inventor of the Foster Baffle, was selected. Foster undoubtedly gave one of the most interesting talks on baffles ever delivered before a body of field men. He explained the intricate parts of some 25 baffles now being sold, telling of their history, their use in the absorber towers, the reason for their design and their purpose in the tower.

A discussion of the subject followed the address and many questions were asked in regard to baffles, some of which follow:

"How would you separate water

Correct Methods Should Be Followed When Sending Samples to Laboratory

By R. C. Osterstorm
In The Pure Oil News

TOO much stress cannot be laid to the importance of proper sampling of petroleum products, for analytical or testing purposes, when it is remembered that a pint, a quart or a gallon is often representative of a tank holding 55,000 barrels or more of oil. If a true representative sample is not obtained, the testing or analytical work done on it has been useless.

In cases when oils of different gravities and other characteristics are pumped into a tank and have not been properly mixed by agitation, stratification occurs. This is, the oil of heavier gravity will be nearer the bottom than oils of lighter gravity, and it would thus be possible to obtain different tests on two samples out of the same tank.

Tanks are best sampled by taking them directly in the bottle from which they are to be tested. Glass bottles are preferable for oil samples, being easily cleaned and inspected for cleanliness before sampling, and are not subject to leaks and corrosion. The bottle is placed in a cage made of galvanized iron and weighted at the bottom, the bail of which is attached to a light chain of sufficient length to reach the bottom of the tank to be sampled.

The open container is then lowered through the opening in the tank until it reaches the bottom (or the top of the water layer when this is present). Thus, the oil will flow into the bottle while descending, taking a portion of the sample at every layer. When the bottom is reached the bottle is then drawn back to the top at the same uniform rate as before. With a little practice, it is possible that when the bottle is drawn to the top of the liquid it will be filled to within an inch of the top. Where an absolutely accurate sample is desired, several samples can be taken by the above method and a composite sample obtained upon which tests can be made.

To determine if stratification has occurred in the tank, the same apparatus as described above is used, except that in addition, a cork to which is attached a string sufficiently long—is loosely inserted in the mouth of the bottle: the container lowered to the point at which the sample is to be taken, and then the cork removed by a sharp pull on the string.

Tank Cars

Tank cars should be sampled from top, middle and bottom,—to detect stratification, water and sediment. On tank car shipments, 1 pint samples from each car are always taken to be retained, and retained samples filed in the order of dates of shipment. The possibilities of error in loading tank cars are grave, and too much care cannot be exercised. Distillation tests are always made on sample from every car.

Barrels or Cans

Sampling from barrels or cans should be preceded by thorough mixing, either by rolling or shaking. Special care is required where packages contain fatty oils or wax stored in low temperatures. The package must be inverted and allowed to stand for twenty minutes before mixing. Sample should be taken with a "thief" made for the purpose. This "thief" usually consists of a glass tube about one and one-half inches in diameter and thirty inches long, tapered at both ends. After the tube has been inserted in the package to the desired depth, the thumb is placed over the upper opening, the "thief" withdrawn, and contents emptied into a clean container for testing purposes.

Coke and Coal

Coke and coal is sampled by the well-known "quartering" method. About five pounds of the thoroughly representative sample of the whole quantity to be examined should be sent to the laboratory. This is broken up and "quartered" in the laboratory until about fifty grams are left. The work is done on this fifty gram sample.

Wax

Approximately one pint of liquid or semi-liquid wax is withdrawn from the top, middle and bottom of the tank. These portions are heated in a water bath, until all of the wax is melted. The bottles are gently shaken so as to insure a uniform mixture, and one-third of the wax in each poured into a dry, clean bottle. This is considered an average sample of the contents of the tank.

Solid wax, such as cakes shall be free from foreign substances. If such substances appear near the surface, they shall be removed, but if they are incorporated in the wax, they should not be removed before sampling. In the case of bags, one bag in every ten is opened, and a pound sample obtained. In the case of barrels,—the head is removed and a pound sample obtained from every one barrel in ten. All domestic samples are held for three months,—and export shipments held for one year. Complaints on quality should be lodged within these periods.

One of the great difficulties most laboratories have to contend with is in being asked for a mass of information on small samples. For complete tests the following sized samples are needed:

Crude Oil	One to five gallons (Depending on work required)
Kerosene	One gallon
300° Mineral Seal	One gallon
Transformer Oils	One gallon
Water	One gallon (Use clean glass bottle)
Gasoline	One quart
Domestic Furnace Oil	One quart
Signal Oils	One quart
Soluble Oils	One quart
"Turpentine Substitutes"	One pint
Gas Oil	One pint
Fuel Oil	One pint
Lubricating Oils	One pint
Cylinder Oils	One pint
Used Oils	One pint

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from oil if it comes from the stills with a slight emulsion?"

"Put it through the heat exchanges so water will evaporate."

"In using centrifugal pumps on absorbers, how can you keep the oil from passing back to the discharger?"

"Put check valve on to keep the discharge back."

"How many revolutions should a centrifugal pump make?"

"In one instance a practical example I remember, the number of revolutions on the pump used from storage to the exchanger was 1753, used from the exchanger to the absorber was 1505 revolutions."

Night Session

The first address of the night session was delivered by J. A. Edwards of the Marland Refining Company of Ponca City. Edwards, with the aid of lantern slides, explained the different forms of distillation, the manner in which viscosity is determined and the different apparatuses which are used in making the tests.

In a complete discussion on the effect of light and heavy oils on bearings, the speaker used the illustration of drawing the finger through the oil as a means of explaining the fact that light oils should be used in bearing lubrication, saying that it was easier to draw the finger through light oil than it was to draw it through heavy oil just the same as it is easier for the bearing to rotate when light oil is used. But burnt out bearings is not always the fault of the oil used, he added.

After he had concluded his talk, the following questions were asked:

"In what way does engine room temperature affect lubrication?"

"Decreases the volume of efficiency as heat expands."

"Is it all right to inject water into the combustion chamber?"

"Yes, if distilled water is used. Emulsions are desired in these engines."

"What is to be gained by putting water in the cylinders?"

"It keeps the center of the pistons cool."

"What is the difference in emulsification and saponification?"

"Emulsification pertains to water. Saponification means to convert into soap."

"Can you get efficiency from drawing water through air before it goes into the combustion chamber instead of running it into the cylinder direct?"

"Yes."

"When water is injected, we have noticed that we are able to save a lot of oil."

A vote of thanks was extended the Association of Natural Gasoline Manufacturers for the promotion of the meeting and the good derived from it.

The next regional meeting will be held in the Burbank field within the next month at which time one of the most complete programs will be given.

How to Treat Discolored Gasoline

Determining unit at fault first step in correcting trouble. Lubrication often the cause

By Otto Peters,
Chestnut & Smith Supt. Kiefer, Okla.

THE gasoline plant operator is confronted with the problem of treating discolored drip gasoline as gathered from the field lines and discolored gasoline made at the plant, which in my experience, has always been traced to the low stage make.

Making discolored low stage gasoline denotes trouble. At plants where there is more than one low stage unit the first indication of discolored gasoline would probably be noticed in the tank used for making. The trouble can then be traced to the accumulator tanks and by taking sample from accumulator tanks, the unit at fault can be found.

After locating the unit at fault, we realize the only part of the low stage gas circuit that could affect the color of the gasoline made is the low stage compressor, and we further realize that it is not only the lubrication of the compressor but also its mechanical condition that affects the making of low stage gasoline.

My experience as a plant operator makes me feel most certain that the lubrication of the compressor plays a vital part in this trouble, and with that in mind, I think it best to touch briefly on compressor lubrication.

Purpose of Lubrication

We provide lubrication on compressor cylinders to maintain a perfect piston seal and a complete film of oil on cylinder wall to prevent wear of cylinder and rings.

In casinghead work, where the gas compressed is casinghead gas, it has an affinity for pure mineral lubricating oil and therefore sometimes necessitates the feeding of excessive oil to the compressor cylinder, because part of the lubricating oil is absorbed by the casinghead gas and therefore we must feed enough oil so that what is left will satisfy the cylinder and rings although we always have before us the problem of keeping down the lubricating oil feed to compressor cylinder so that there will be the lowest possible amount picked up by the gas so no discoloration will occur in the gasoline.

In casinghead work, most all compressor bearings are lubricated by splash system and in selecting a medium bodied, pure mineral oil especially manufactured for compressor cylinder lubrication, by using it in the crank case, if any oil gets on the rod and is carried into the cylinder, it is still the correct oil. Oil used on compressor cylinders in gasoline work has several factors to be considered.

A compressor with rotary valves (Corliss Type) will require the same grade of oil but a larger quantity over a period of time, than a poppet type valve. In fact, on the latter type of valve, very little, or practically no oil is required and our aim would be to satisfy the piston rings and cylinder only, whereas on the Corliss type, due to the larger wearing and bearing area of the valves and the fact that oil must be applied direct to the end or center of valves, more oil is required. in which case we can always rely on piston and cylinder being well, or over-lubicated if

(Continued on page 22)

Chestnut & Smith Corporation

LABORATORY TEST

No. E-2212

Product Tested Steel Bottoms

Thermometer No. 98639

Gravity 58 @ 102 = 53.5 @ 60 °F.

Temp. Cond. 32 °F. Temp. Room 67 °F.

CC. tested 100 @ 102 = 94.6 @ 60

Initial 170 °F.

Dry Point — °F. Max. Temp. 486 °F.

Residue 31.7 % Loss 1.4 %

Color Yellow Odor —

Doctor —

Flash — °F. Fire — °F.

Tested at Kiefer Lab @ 60

By J. C. Fischer

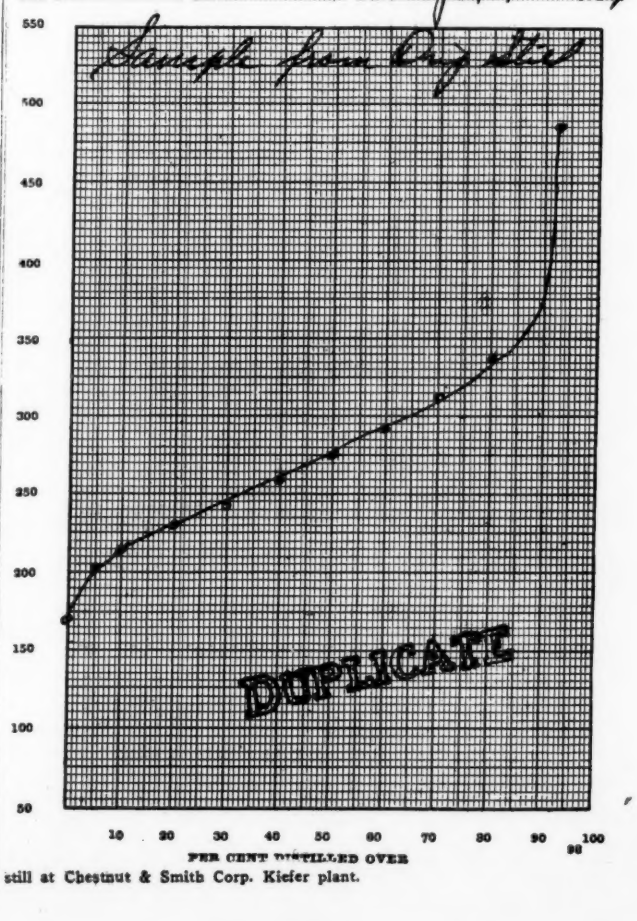
Approved

Shipped from

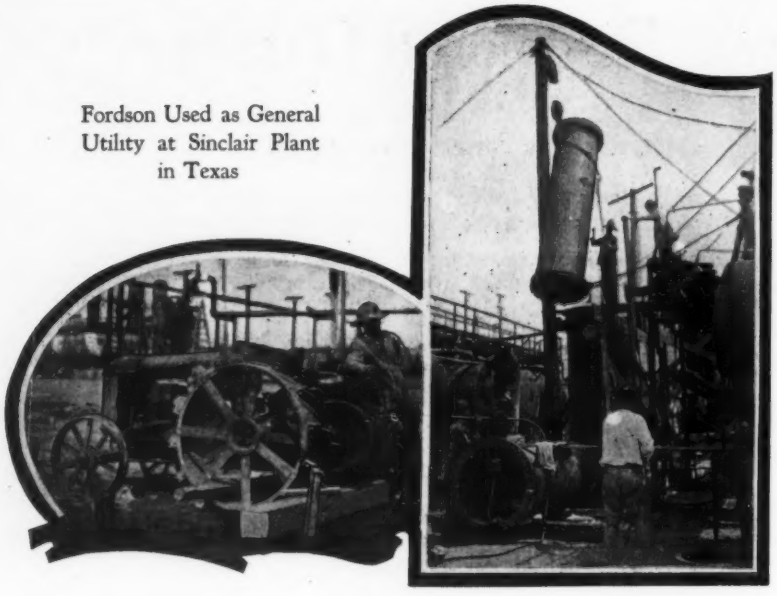
To At

% Over	Temp. °F.
5	202
10	214
20	230
30	242
40	260
50	275
60	292
70	312
80	338
92.5	486

Car No. ..... Init. ..... Date April 9 192 4



Result from running sample from drip still at Chestnut & Smith Corp. Kiefer plant.



Fordson Used as General Utility at Sinclair Plant in Texas

Small Tractors Make Efficient Power Unit for General Plant Utility Work

WHEN there is need for a power job around the plant of the Sinclair Refining Company on the Houston Ship Channel, they begin calculations which result in one of the Fordson tractors being put to the task. There are six Fordsons at the plant and their use is as broad as the building and operation of a modern refinery. Some of the work done by these tractors requires a special equipment. In other instances, a tractor may be put to some unique task by adapting it to the needs of the moment.

Hauling and Hoisting

Hauling and hoisting are the chief uses of the Fordsons at the Sinclair plant. Hauling calls for only the tractor without other equipment. A favorite use in hauling is to pull loaded wagons over the grounds. But steel for building tanks or stills often is taken to the place of erection with a Fordson doing the pulling. In construction, the Fordsons with oil field winches hoist most of the equipment as building progresses.

With dump scrapers attached to the front of the tractors, they are in frequent use, back filling pipe line trenches. This attachment was used for a time in building fire walls around tanks but was later abandoned. The tractors have also been used for pulling mowers.

Hoisting is perhaps the most extensive use of the Fordson at the Sinclair plant. For this, a winch of the oil field type has been adapted as part of the equipment for the hoisting tractors. The value of the Fordson for hoisting is that it can be taken to the scene by its own power, its wheels blocked, a hoisting beam set up and it is ready for duty. Thus the Fordson is flexible in that it can be taken to the point where hoisting power is required. Then it saves time because it can be set up more quickly than a stationary hoisting engine with its drums and cable.

How It Is Done

For ordinary hoisting, a pole is used for a lifting boom. It is set perpendicular, with the blocks attached to the top. This pole is placed convenient to the scene of construction. Then a Fordson, with winch attached, is moved to a safe distance and set up with the rear end toward the pole. Large timbers are used to block the rear wheels, giving the tractor the effect of a stationary hoisting engine.

When the Fordson is in place, the cable from the winch is run to the blocks at the top of the hoisting pole. The motor is then started and can be left running as long as there is need for power. The tractor operator then becomes an operator of the winch, applying power to it as needed through the use of the clutch and gears off the tractor motor.

Used in this way, a Fordson may have one position for a day or several days, while other Fordsons haul material to be lifted by the one on the hoisting job. The bulk of the hoisting necessary to the extensive construction work nearing completion at the plant has been done with the Fordson tractor. Where Fordsons are left in position overnight, they are covered with tarpaulins for protection.

By putting two Fordson tractors on one job, the Sinclair construction engineers have used them for pulling completed stills in place. For this work, a slide is prepared for moving the still to its position. Two Fordsons, with winches, are then set for pulling and the lines and blocks arranged so one tractor can pull at either end. When all is ready for the pull, the still is moved up the timbers, with a tractor pulling at each end of it.

A dump scraper, designed especially for attaching to the front of the Fordson, is used for back filling pipe line trenches. This scraper is operated by the truck driver, taking its power off the tractor motor. It can be raised and lowered on the standards in front of the tractor.

When lowered, it plows into loose dirt and loads from the movement of the tractor. When the shovel is full, it can be raised to a desired height on the standards, after which the tractor can go to the required dumping ground. The dirt can be dumped while the shovel is raised.

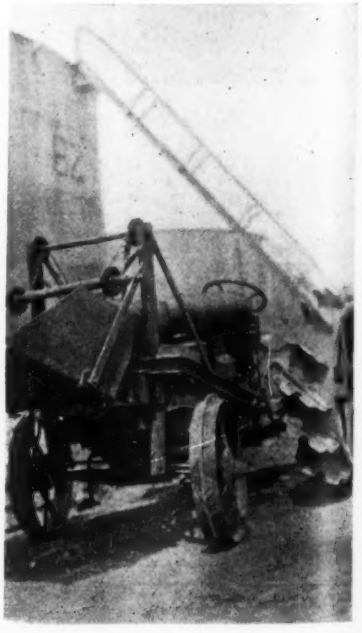
For back filling trenches, the tractor with this equipment is used by following the completion of the line and shoving the loose dirt back in place.

These scrapers also can be used for removing dirt or for filling some low place around the refinery grounds.

The Fordsons are part of the motor equipment of the Sinclair plant. They are kept in the garage and the operators are men of experience in handling this equipment.

Leases Refinery

Wichita Falls, Texas.—A lease has been taken on the Keystone-Ranger Refining Company's 2000-barrel daily capacity skimming plant located near Wichita Falls by E. F. Griswold and others, and the plant will resume operations this month under the name of the Wichita Refining Company.



All ready for dike work. This type of equipment has been used by the Sinclair Refining Company for building fire walls around storage tanks.

They didn't take a chance

Vogt Stills were ordered

SPECIFICATION

Size — 10′ dia. x 60′ long

Plate Thickness — ⅞", 1" and 1⅛"

Rivets — 1¼" swelled neck

Operating Conditions — 100 lb. @ 800° F.

Test Pressure — 225 pounds

Shipping Weight — 107,500 pounds

Low carbon open hearth still-bottom steel.

Edges of all plates machined on plate planer — not bevel sheared.

Circumferential joints assembled by expansion and contraction method.

Rivet holes drilled from solid plates after assembly.

Seams electrically welded inside and outside — instead of calked.

THE men responsible for the purchase of equipment at this large eastern refinery knew that they could not afford to buy other than the best. They realized that destruction of property and loss of life frequently result from apparently slight defects in such high pressure and high temperature stills.

They also realized that every so-called boiler shop is not competent to build stills — that special equipment and an organization trained up to that high grade workmanship (see specification) is necessary to produce stills that will not require frequent and expensive repairs to keep them tight. This is another reason why they ordered Vogt Stills.

And they didn't take a chance upon costly delays in their construction program due to failure of the manufacturer to complete the stills as required. They were confident, when they signed the contract, that the stills would be completed as specified. Their confidence was not misplaced. The promised shipment was anticipated almost three weeks.

HENRY VOGT MACHINE CO.

Incorporated

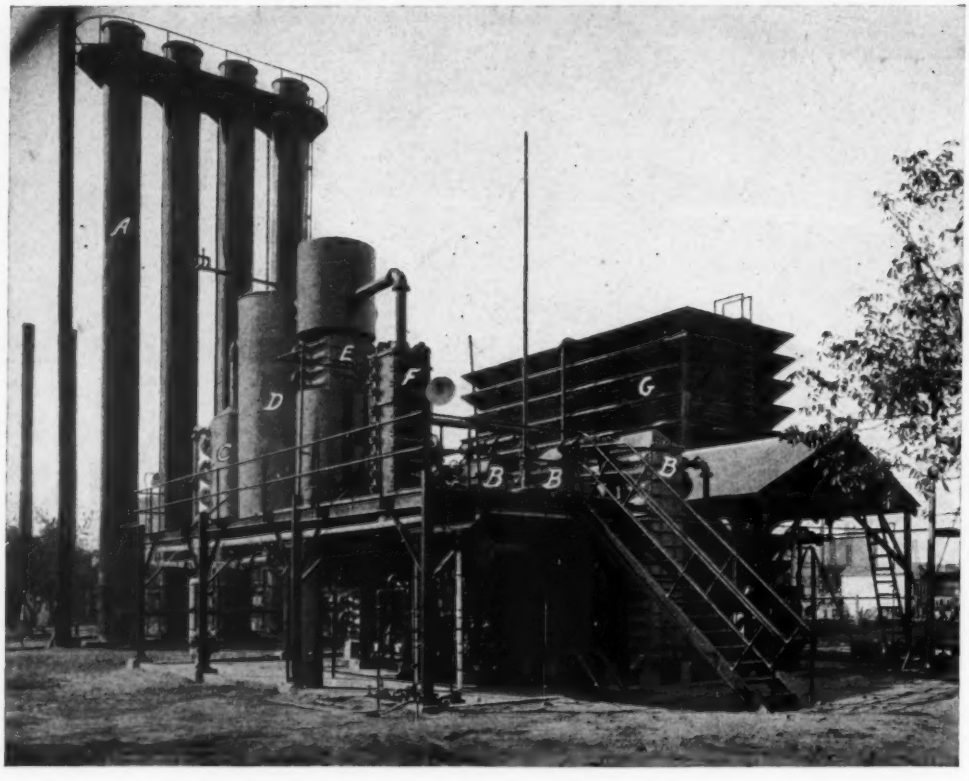
LOUISVILLE, KENTUCKY

Branch Offices: NEW YORK, CHICAGO, PHILADELPHIA, DALLAS

Manufacturers of Oil Refinery Equipment, Water Tube and Horizontal Return Tubular Boilers, Drop Forged Steel Valves and Fittings, Ice Making and Refrigerating Machinery.

Tell them where you saw the ad

SOUTHWESTERN



A Complete Southwestern Plant with a daily production capacity of 15,000 gallons of gasoline.

(A) Absorption Towers
(B) Vertical Heat Exchangers
(C) Pre-Heater
(D) Evaporator
(E) Dephlegmator
(F) Gasoline Condenser
(G) Water Cooling Tower

COMPLETE GASOLINE ABSORPTION PLANTS, NOTED FOR EASE AND FLEXIBILITY OF OPERATION

SOUTHWESTERN ENGINEERING CO., INC.

90 West Street, New York
Tulsa, Oklahoma

SOUTHWESTERN ENGINEERING CORP.

1221 Hollingsworth Building, Los Angeles, Calif.
Casper, Wyoming

Factories
Culver City, Calif. Olean, N. Y.

Designers and Builders of Complete Refineries, Absorption Plants, Fractionating Installations, etc.

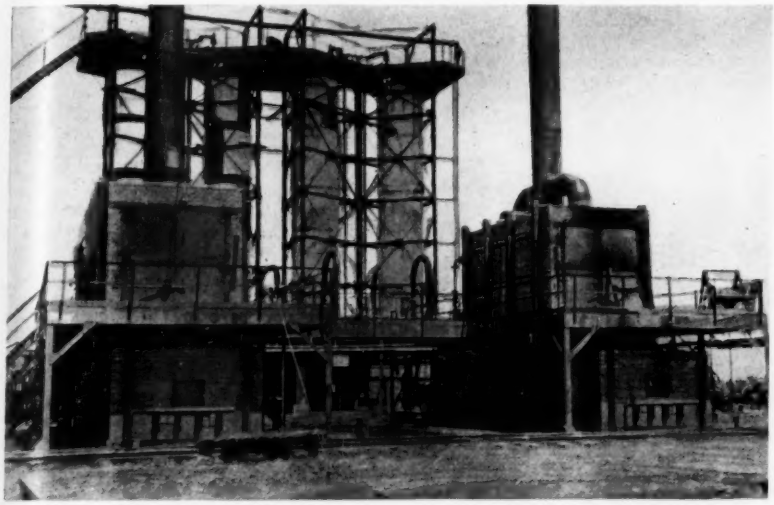
Manufacturers of Condensers, Oil Coolers, Pre-Heaters, Evaporators, Dephlegmators, Heat Exchangers, Bubble Towers, Mist Extractors, Water Cooling Towers, etc.

Tell them where you saw the ad

Flexibility Gained in Invincible Cracking Plant

Adaption of Carlton-Ellis Process allows cracking crudes or topped oils, leaving commercial fuel oil and gasoline that requires no blending

Through an adaption of the Carlton-Ellis cracking process, the Invincible Oil Company has completed installation of a plant at Bossier City, Louisiana, whose chief characteristics are that it can be adjusted to run crude and topped oils of varying qualities and will turn out gasoline, which does not require blending to convert it into a commercial product.



The cracking coils are enclosed within the vault-like construction behind the steel doors of each unit. The upright cylinders in the rear are the soaking drums. Stills and fractionating equipment are not in view.

As used in this Louisiana plant, the combination of coils and drums has pressure applied to only part of the equipment. The plant is a combination of a cracking still and the regular crude still.

The process is that licensed by the Standard Oil Co., (N. J.) and is similar to other plants using the process. But in building at Bossier City, the Invincible has taken into account the several classes of crude or topped oil it will use and has constructed a plant sufficiently flexible to allow the running of any of these products. The plant has two units, each of 2,000 barrels daily throughout.

Heat Under Pressure

The oil to be run is fed into the coils under pressure of 350 pounds, the pump supplying the oil being used for this pressure. Natural gas is used for heat, whose intensity is determined by the oil to be run. Usually the oil passes through these heated coils at the rate of 5,000 gallons an hour, passing from there into the upright soaking drums, over which the 350 pounds pressure also is maintained.

The quality of the product being run determines how long the heated oil must remain in these soaking drums. Usually it is released steadily, passing into the horizontal vaporizing stills and from these into the fractionating equipment and then through the look boxes.

Gasoline thus distilled does not require any blending to bring it to the boiling points of commercial specifications, as it can be treated as straight run gasoline. After the gasoline has been removed a commercial fuel oil remains, free from the suspended carbon, present in the residuum of some cracking processes.

The following description of the plant and its operation has been given out by the company:

"Every refiner undoubtedly is confronted with the question—how flexible is my cracking equipment? Such was the problem thoroughly considered by the Invincible Oil Company in installing a cracking plant which not only would meet its present needs but also the needs of the future.

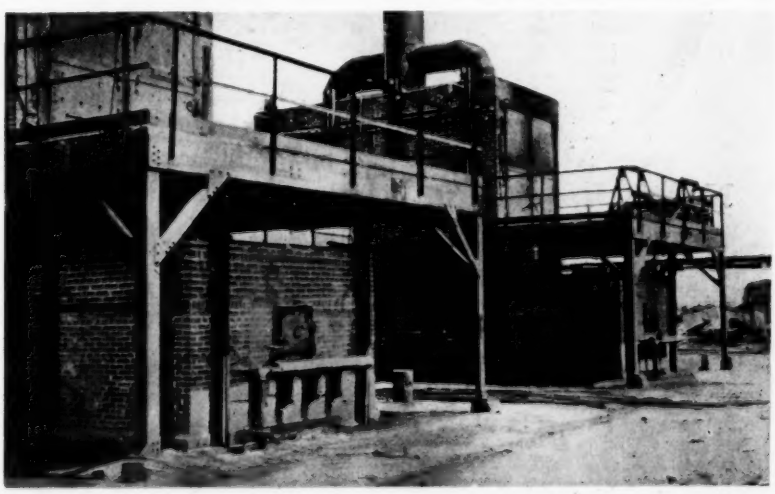
"It has been the endeavor of the company to construct a plant sufficiently flexible to handle various stocks and in various ways. In the opinion of many, this has been accomplished at the plant now running at Bossier City, across Red River from Shreveport.

"The present plant consists of two cracking coils, each with a capacity of 2,000 barrels daily throughout. Each coil is heated to temperature suitable for cracking the particular stock under treatment, and passes at 350 pounds pressure into the upright reaction chambers, more commonly called soaking drums, where it is held under temperature long enough to allow the time element to enter in after which it is released from under the pressure into vaporizing stills. Here the products of cracking vaporize and pass overhead through fractionating equipment, eventually to run down through lookboxes into the tanks.

Residue Good Fuel

"The residue left in the vaporizing still is of excellent quality and marketable as fuel oil. The overhead distillates require no blending to make them meet the various boiling points of present gasoline specifications, but are marketable simply by further treatment.

"The flexibility of the equipment is brought about by the reaction chambers, or soaking drums, of which there are two to each system. These can be operated single, or in pairs, or can be omitted entirely, according to the oil undergoing treatment. On materials that tend to give a considerable amount of coke deposit in these chambers, the system can operate with one chamber while the other is being cleaned, or the amount of coke deposit which would be formed in one drum over a certain



Natural gas is used for fuel. The two fire boxes are shown here, each beneath a cracking coil.

period can be cut in half by using both drums, which materially reduces the time required for removing this coke.

"On stocks requiring less time for cracking, one drum makes an excellent run, and when it is desired simply to lower viscosity for fuel oil production, taking off only a small percentage of overhead distillate, the drums may be by-passed entirely.

"The length of the running varies with the type of stock put through the system. The average is six days on crude oil or gas oil, after which the equipment must be cleaned. Likewise the percentage of gasoline will vary according to the results desired on the particular stock being run, but can be controlled easily.

"This particular plant has taken advantage of fractionating equipment suitable to its needs as well as to depart from the common practice of carrying pressure throughout the entire system. Thus it becomes practically a combination of a cracking still and a regular crude still, so that it is possible at all times to see the quantity of oil that each still is running, rather than being dependent on a mechanical means of measuring. Likewise the quality of the overhead products always is open to visual inspection.

"The plant is complete in itself, having separate tankage to care for stocks run. Its products go direct to the market without entering into any other branch of the refinery. It has its own boiler plant, water pumping station, continuous treating plant and loading racks. It is dependent on outside sources for only the stocks to be cracked.

The equipment has been designed and installed to give the utmost from an economical as well as a safe operating standpoint. The best of material has been used throughout and much of it is designed especially for the service it is to perform. All lines under temperature and pressure are seamless drawn tubing and are fitted with hydrauilc type fittings, with tongue and groove joints, giving an exceptionally high safety factor for this type of equipment. The large reaction chambers are of the riveted and welded type of two inch metal.

Fuel economy is brought about by utilizing heat exchange wherever practical, so that the oil enters the heating coil at a temperature of 450 degrees. This not only makes for economical operation, but also lengthens the life of the heating coil and brings about a more uniform operation.

Tank Cars for LEASE

at Attractive Rates

All in perfect Condition

If you are interested in tank cars, or expect to be in the next few months, you'll find good news in the fact that a few North American cars are still available for long or short term leases.

N. A. T. X. cars are too well known to require lengthy comment. Kept in tip-top shape in three modern repair shops (Chicago, Tulsa and Coffeyville, Kan.) they are ready when they report to give the highest type of service. In other words, you get all the service that well-conditioned cars can give without the trouble, expense and capital outlay entailed by owning them.

Long or Short terms

Write today for details.

North American Car Company

327 S. LaSalle St., Chicago

Southwest District Office:
Petroleum Bldg., Tulsa

By the North American System
It is Cheaper to Lease than to Buy

How to Treat Discolored Gasoline

(Continued from Page 17.)

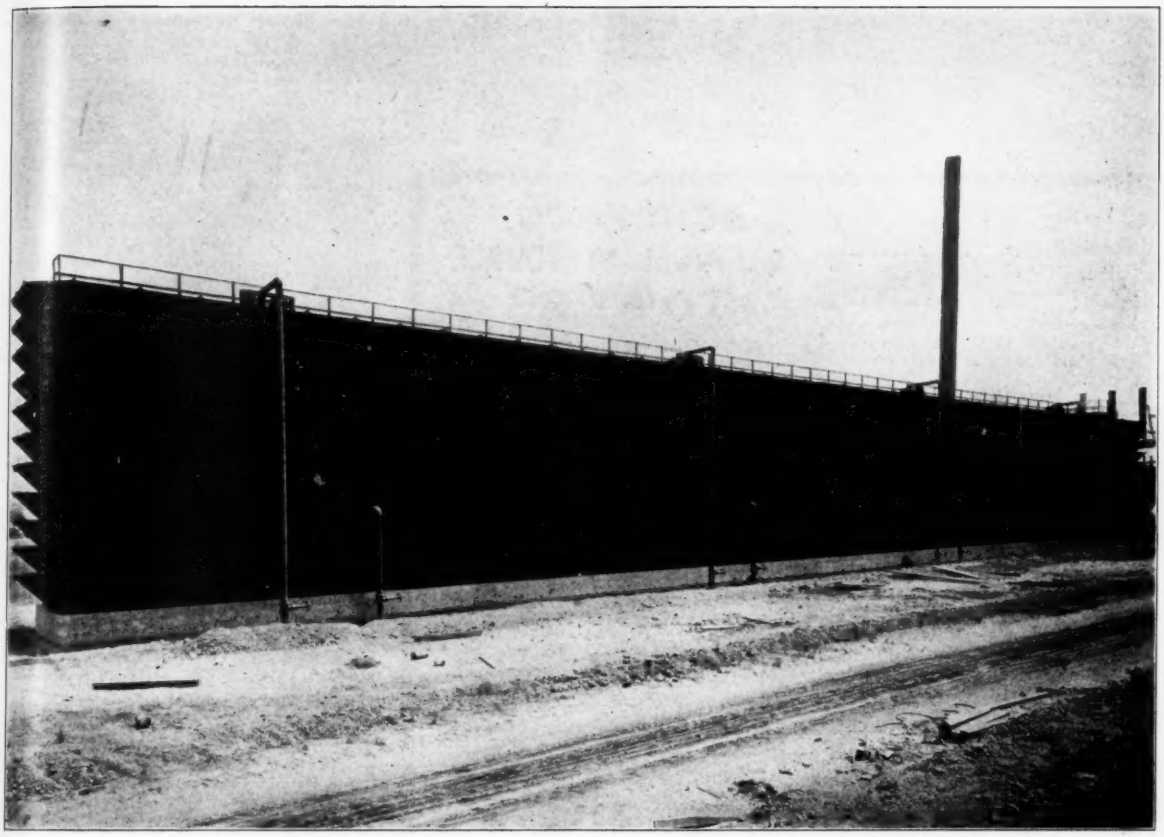
these valves are barely satisfied. If an exceptionally wet or rich gas is being handled, the gasoline wash becomes a factor and a straight mineral oil will be rapidly cut way, since it is necessary to use a compounded oil, so compounded that it will withstand the gasoline wash and maintain a lubricating film on the cylinders at all times.

Cause and Remedy

In concentrating the trouble of discolored low stage gasoline in the low stage compressor, I can only say that we must carefully consider the quality of oil used; means of application and quantity used. Assuming then, that these factors are OK, the only possible other trouble is oil being carried over on the rod. We have in mind that the compressor has an intake of so many inches of vacuum. This vacuum easily sucks oil off the rod if the packing enclosing the rod should leak, and in this connection I can only recommend that the level of oil in crank case be carried as low as possible. It may be that the oil in crank case of compressor is different from the oil used in compressor cylinder, so that if only a slight amount of oil is carried over, it affects the gasoline. On the other hand, should the oil be the same, the oil carried over would cause an excessive amount of oil being fed to compressor, and of course an excessive amount of oil will surely cause discolored gasoline.

Where traps are installed on the discharge line of compressor, they too, must be looked after. They are of limited capacity, and I feel they should be periodically cleaned. One other factor I have in mind is the volume of low stage gasoline made over a period of twenty four hours—that is to say, where the gas has an affinity for oil and carries oil vapor in suspension, I believe it is so small an amount that several thousand gallons made in a day will absorb it so that it practically is not there. On the other hand, in plants

Braun



Braun Cooling Tower To Which Two Additions Were Made in Southern California Oil Refinery Capacity 5,000 G. P. M.

Manufacturers of

Petroleum Refining Apparatus,
Casing Head Gasoline Recovery Plants,
Fluid Heaters, Coolers & Heat Exchangers,
Water Cooling Towers
By-Pass Valves, Expansion Joints,
Strainers & Grease Extractors,
Other Mechanical Specialties.

Catalogs or Bulletins on Request

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Manufacturing Mechanical Engineers
Factory & Executive Offices - Alhambra, Cal.
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making less than a hundred gallons a day, it is almost an impossibility to entirely prevent discolored low stage gasoline.

Treatment

In plants under my supervision, we use steam stills for teratment of discolored gasoline. I do not advocate the use of fire stills, primarily on account of the fire hazard, and again, the use of fire stills increases the expense of insurance. To my notion, the steam still should be of a capacity large enough to make easy operation; it should be protected with pressure relief valve and vacuum cup, and the vapor line from the still should be of large capacity to prevent pressure accumulation on the still. Also, I do not advocate the use of automatic devices on the still. At best, they are bound to get out of order when least expected and we find in practice that operating the still the same as distillation apparatus (by that I mean, slowly and carefully) we get best results.

In operating the still for drip gasoline, we operate at a still pressure of 3 to 5 pounds; a temperature of not less than 225 degrees F. nor more than 250 degrees F. and distill at a rate of 50 gallons an hour. The tank we make in is maintained at a pressure of Zero Gauge to 1 to 3 inches of vacuum. The gasoline entering the still is controlled to same rate as gasoline distilled off. If this is not convenient, we simply charge the still with several hundred gallons and distill it off at above mentioned rate. For your information, I submit a distillation report on undistilled drip; distilled drip and the residue, or still bottoms.

Undistilled Drip	
Be.	66.7
Initial	90
End Point	332
Recovery	97.2%
Dist. Loss	2.2%
Distilled Drip	
Be.	66.4
Initial	94
E. P.	330
Recovery	96.5%
Dist. Loss	3.0%
Still Bottoms	
Be.	53.5
Initial	170
End Point	486
Recovery	94.9%
Dist. Loss	1.4%

The still bottoms is of such small quantity, we use it to wash rags. At one plant under my supervision, where the still bottoms quantity is large enough, we charge it into our still at absorption end and dispose of it in that way. I might add that we notice that the drip gasoline leaves a larger amount of still bottoms in summer months than in winter months.

Where the distilling of drip gasoline is comparatively easy, there is a difference in distilling the off-colored gasoline made in the plant. You can readily appreciate the difference in the two products. I have referred to the handling of the still as being the same as operating distillation apparatus in the laboratory—that is, carefully and slowly. In distilling the discolored gasoline made, great care must be taken to prevent pressure rise caused by distilling too fast. Temperature must be applied slowly, or if desired temperature is constant, the gasoline must be charged into still slowly.

Figure 102
Acid Proof Flat Tower Cover

Figure 107
Open Type Acid Proof Distributor

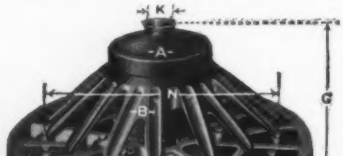


Figure 110
Closed Type Acid Proof Distributor Assembled.

Our ware is universally acid resisting regardless of strength and temperature of the solution and is used for all problems involving corrosion in acid and chemical plants as well as plants of the affiliated industries.

"It Is in the Body Itself"

We make every description of Chemical Stoneware. Let us know your requirements.

Write for our fully illustrated and descriptive catalog

ACID PROOF CHEMICAL STONEWARE TOWERS

COMPLETE OR IN PART FOR YOUR ACID PLANT

Absorbing—Condensing Drying—Neutralizing

We can supply your needs in complete Towers of stock design or any necessary parts from 10" to 60" bore. We also specialize in making Towers or parts in your own design and to your prints and specifications.

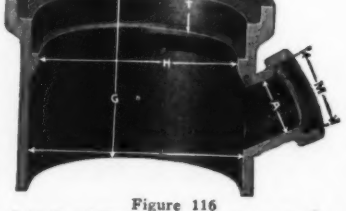


Figure 116
Acid Proof Tower Bottom or Top Section.

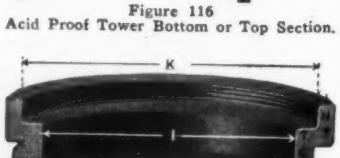


Figure 118
Acid Proof Tower Base or Cascade.

MAURICE A. KNIGHT
OFFICE & FACTORY
8 KELLY AVENUE
Akron, Ohio

Lubricating Company Opens Blending Plant in Tulsa

Tulsa, Okla., August 11.—The Rolay Lubricating Company of Tulsa, a recently organized company, has completed its lubricating and blending plant in the northeast part of the city, at 812 No. Lewis Place. At present the capacity of the plant is three tank cars per day when sold in tank car lots, and approximately one car load of drums when sold in job lots.

The company is composed of W. K. Warren, Charles E. Brown, J. M. Giltner, and V. L. Davis. Mr. Giltner, a lubricating oil expert formerly with Cosden and Company, will have charge of plant operations, while Mr. Davis and W. L. Crow, formerly with the Sinclair Refining Company, will have charge of sales.

Marshall Belongs

Kansas City, Mo.—E. C. Marshall, formerly in charge of the Augusta, Kansas refinery of the White Eagle Oil and Refining Company, has been transferred to Kansas City headquarters and appointed general superintendent of refineries. This promotion given Marshall will result in the transfer of C. C. Durkee, superintendent of the Fort Worth refinery, to take charge of the Augusta plant, while H. G. Neavitt will succeed Durkee at Fort Worth.

Present Refining Policies in California

A discussion of widely held views on technical developments and market trends

By Carl J. Von Bibra

SIX MONTHS ago the writer published a paper in this journal which outlined the conditions then existing in the California refining industry. An attempt was also made to get a glimpse of what the immediate future had in store. This is always an unpleasant and generally unsatisfactory thing to do because if any individual engaged in the oil industry in the United States were a uniformly successful prophet that person would be so busy taking care of his rapidly accumulating fortune that he would have no time left to write or to be interviewed. However, it happens that most of the forecasts made in the above mentioned paper have become actualities. With this in mind it will be interesting to make another analysis of the refining situation on the west coast at the present time. Several things have happened during the past few months which tend to blur the outlook.

Despite the fact that California crude production has been declining rapidly since last August the amount of oil held in storage has consistently increased. During the past six months stocks in the state of California have increased at the rate of something over a million barrels per month. Until a few weeks ago it was generally felt that it was just a question of two or three months until the consumption of oil in the normal Pacific Coast market would be equal to the amount of oil produced and that all shipments to the Atlantic Seaboard and to Europe would represent drafts on storage. For the last several weeks, however, oil production in California has refused to decline. In fact it has increased slightly. This unexpected development has prompted the Shell Company of California to again shut in most of its Coalinga production. At this writing nobody knows with any degree of certainty whether the decline in production has been temporarily checked or whether it will set in again immediately. It is only natural that a paper decline will be shown if the shutting in of settled production is to be resumed on any scale. However, for market purposes oil retained in the ground in a fully developed field capable of immediate resumption of production is all the same as oil held in reservoirs or tanks.

Possible Effect of Dominguez and Athens

Of the three big gusher fields which raised so much havoc during the past two years in California, Huntington Beach and Santa Fe Springs are pretty well settled. Long Beach is well along on its decline but is holding up much better than the other two because of the extraordinary thickness of its sands. The Torrance-Lomita District has seen its best days. However, several operators such as the Chanslor-Canfield Midway Oil Company and the Shell Company of California still have imposing drilling programs ahead of them in this field so that the decline in production here will probably be slow and not of sufficient importance to materially affect calculations involving the whole of California. Therefore, in view of the fact that the output of the Dominguez and Athens Fields will in all probability increase during the next six months we have only one declining field of any importance with which to offset this increase. That field is Long Beach. The rate of its decline has been quite well established. The probable rate of increase in the Athens and Dominguez districts is, however, entirely unknown. What is known is that the oil is of high gravity. The discovery of 42 gravity oil in the Rosecrans section (south end of Athens-on-the-Hill) within the past two days has created a sensation. This is about as high as any commercial production which has ever been found in California. There are a few isolated instances of higher gravities having been found in small wells in Ventura County but the yields have been so small that these wells have been of no particular importance in the industry.

For a while there existed a rather friendly co-operataion between the Shell Company of California and the Union Oil Company of California due to the ownership of a 26 per cent stock interest in the Union by the Shell Union Oil Company. This spirit of co-operation did not seem to last, though, and now that Shell has sold its Union Oil stock the two companies are apparently acting entirely independently. This is important in connection with the Dominguez Field. The Union and the Shell own most of the important acreage in this field and while it has formerly been possible for both companies to restrict their drilling on adjoining leases it seems that they are now both going ahead full tilt to develop all the production possible at Dominguez.

At Athen-on-the-Hill we have another situation. This field is at present far from being defined. At the same time all the land in the immediate vicinity of present production is held in rather small parcels. One of the most likely portions of the field is embraced in the Howard Townsite. The refiners of California are naturally wondering whether we are going to see another rising flood of oil in the course of the next few months. It is still too early to predict what will happen. However, in the meantime everybody is getting cautious.

Large Stocks a Depressing Influence

If we take into consideration field, pipeline, refinery, tank farm and terminal stocks there are at the present time more than 105,000,000 barrels of oil in storage in California. The normal marketing territory of the state is now consuming in the neighborhood of 450,000 barrels of oil per day. Thus the oil now being held represents a 233 days supply at the present rate of consumption in this territory. Such a staggering surplus can only mean that oil will be shipped out of this marketing territory until the capital frozen into these inventories has largely been released. Oil held in storage doesn't pay dividends. On the contrary in the case of the California companies it requires bond interest.

Following the same line of reasoning through, oil can only be shipped from California to the Atlantic and Gulf Coasts and to Europe if the price is kept sufficiently low to overcome the cost of the long haul. It is of course impossible to actively sell oil for export at prices much lower than those charged local consumers. Therefore the indications are that California prices haven't got much of a chance of rising from present levels unless prices east of the Rockies rise. The present keen competition in eastern consuming centers therefore doesn't look very good to the California oil man.

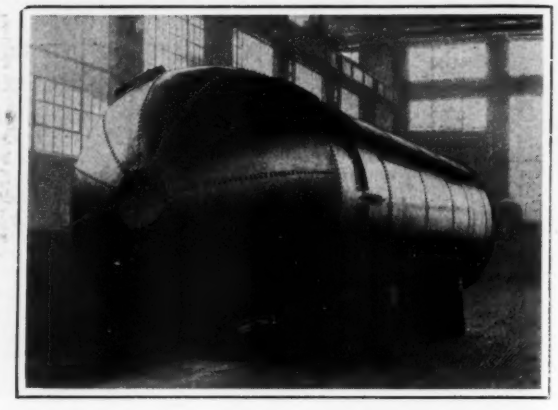
Local California Price Situation

Marketing sentiment is one of those curious human phenomena which are able to right-about-face on a moment's notice. Early last spring all the refiners and marketers of California were joyous. It was still kind of hard going but the crisis was over, so everybody said, and from then on everything was to get better and better. What actually happened was that prices advanced too fast with the inevitable result that they soon started to sag again. So it became customary to wear long faces once more and act as though the bottom had dropped out of everything. Soon it was taken for granted that crude prices were going to be reduced again. All other products would of course slide along with crude. Officials of companies with large inventories had visions of a sudden melting away of the paper profits accumulated during the short-lived rise. The whole California oil world was worried.

Now within the past few months President Kingsbury of the Standard Oil Company (California) has made a public statement to the effect that it is his opinion that California oil prices will not be reduced. In view of the dominating position which the Standard Oil Company holds in California there was a widespread feeling of relief over President Kingsbury's statement. Sentiment immediately swung to the other side and the opinion was generally expressed that because the head of the Standard had said that prices probably would not go down there was nothing to it; they simply wouldn't go down, that's all.

This is all very good but now another factor enters the problem in the southern part of California. A general price-cutting campaign has opened up.

(Continued on Page 28.)



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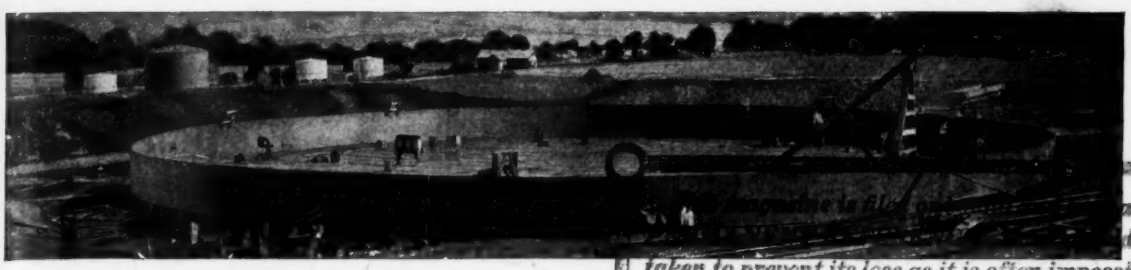

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Present Refining Policies in California
(Continued from Page 25.)

There has been considerable so-called "Bootlegging" of gasoline in the Los Angeles district for several years. Sometimes the situation becomes bad enough to constitute a real source of trouble to the large established marketing companies. Again at other times nobody pays any particular attention to it. Right at present several of the long established medium sized refining companies of southern California have practically gone into gasoline "bootlegging." The trucks of numerous cut-price distributers are furnished all the gasoline they want irrespective of responsibility. If this practice is continued for any length of time it will mean the certain undermining of the California price structure because gasoline is the mainstay of the market and Los Angeles is a main distributing center. Then again the fact that established companies are abetting the price cutting simply means that they are themselves in a precarious financial position. The handwriting is on the wall and there is little doubt that many of the smaller refiners of California will go under. In one instance a plant built during the boom of 1922-1923 has already been operated under four distinct ownerships in the year and a half since its completion. As far as the little companies, that is companies without adequate financial backing, are concerned, they are in a precarious condition.

Technical Policies

All this uncertainty in the marketing end of the business is reflecting itself in the physical end of the refining business. Naturally no new plants are being constructed at present. Numerous old ones and recently completed ones are standing idle. Very little new construction is going on as far as additions to and improvement of existing plants are concerned. Everybody is trying to stand pat and hold on to what they've got.

Six months ago quite a bit of interest was aroused in connection with the possible resumption of cracking operations by the big companies in California. Even the small refiners were looking into the feasibility of increasing their gasoline output by the installation of cracking units of one of the established and proven processes. At that time the statement was made in this journal that "despite the enormous surplus of gasoline in the state, the handwriting on the wall is plain enough. In 1926, or at latest 1927, cracking will be absolutely necessary. The only thing which could prevent this would be the bringing in of another enormous flush production. Such a flood as is just receding is not likely to come again immediately." When that statement was published a number of people took violent exception to it. They felt that cracking operations on a large scale would be carried out in California long before 1926. However, during the last half year interest in cracking has died down on the Pacific Coast. To be more accurate, there is a great deal of interest being shown in the development of the federal suit against the companies controlling and licensing patent processes. But from the viewpoint of going ahead and installing cracking plants immediately—that is another matter. None of the California companies appear to be at all enthusiastic about going into the cracking business now, but barring the influence of a long drawn out federal suit which would unduly delay action along this line when cracking becomes commercially feasible, it still appears logical that the California refiners will be cracking on a large scale "in 1926 or at latest 1927."

In the meantime, instead of trying to increase the gasoline yield, quite a bit of the gasoline actually obtainable from the crude being run is left in the heavier distillates. The gasoline being marketed in California and the Pacific Slope generally has an end point averaging about 425 degrees F. instead of the 437 degrees required by the navy specifications adopted by most of the large cities and other communities. Service station gasoline having an end point of 420 degrees or even 410 degrees is not uncommon. This is not due to sloppy refining but is the natural result of keen competition for the consumer's patronage.

Under normal conditions, i. e., when supply and demand are not too far out of balance, the following products are cut from California crude for the Pacific Coast market:

Gasoline
Engine Distillate
Kerosene (Domestic and Export)
Stove Distillate
Furnace Distillate
Gas Oil, identical with Diesel Fuel
Lubricating Stocks
Asphalt

Only a very small proportion of the crude is run for lubricating stocks and likewise only a part of the heavy distillates are removed since the market for these, even in balanced times, is limited. Therefore the cuts above enumerated as Gas Oil, Lubricating Stocks and Asphalt are generally combined to make Fuel Oil (Residuum).

Under present market conditions most of the California Fuel Oil contains not only the Gas Oil, Lubricants and Asphalt but also the Furnace Distillate (28-30° A. P. I.), the Stove Distillate (33-35° A. P. I), practically all the Kerosene (38-40° A. P. I.), and much of what would ordinarily go into Engine Distillate (43-45° A. P. I).

Most of the Engine Distillate being made is a close-cut and treated product refined for shipment to the Atlantic Seaboard. In the true meaning of the terms as used on the Pacific Coast for many years this product is not an Engine Distillate at all but simply the heavy end of commercial gasoline. It makes an ideal commodity to ship through the warm waters of the Caribbean Sea and Gulf of Mexico as it is not subject to the evaporation losses suffered in the shipment of gasoline from California to the region east of the Rocky Mountains. The consumption of regular Engine Distillate on the Pacific Coast has slumped almost to the vanishing point because of the cheapness of gasoline.

The kerosene market is very dull. There is of course a regular demand from domestic consumers. This does not vary very much but it represents only a very small proportion of the to-

(Continued on Page 36.)

Colloid Mill Aid to Process Plants

Cracked residuum converted into commercial product with method that suspends embryonic coke

By William A. McLean
Research Chemist, Premier Mill Corporation, Geneva, N. Y.

THE oil industry is vitally concerned in processes and products of a colloidal nature to which the colloid mill is peculiarly applicable. Capacity, power consumption and quality of product are indispensable commercial requirements.

While this article deals primarily with the production of fuel oils and the suspensions of "coke" in residual oil, yet, other oil processes and products are enumerated to show the wide applications already commercialized, as the result of tests and demonstrations with the Premier Colloid Mill.

The mill is the invention of Frederick J. E. China, chemist and plant manager for Burt, Boulton & Haywood, Ltd., of London, tar distillers and chemical manufacturers. The invention resulted from research and development in the processes and products of that company, where it was employed for about a year before publicity was given to it; the development of a colloid mill was of primary importance, and until its use and efficiency had been tested and proved in their own plants, exploitation for general industrial distribution was withheld.

It is adapted to the economical disintegration of solid, plastic or liquid masses into colloidal particles whose dimensions are one micron or less in diameter. Permanent suspensions of such solids being easily obtained. In the words of the inventor, it has developed a new art and technology—"mechanical chemistry."

Many solids are reduced to such a fine state of subdivision that they pass freely through filter paper.

The dispersion occurs within the liquid medium of film, so that the disruptive action is accomplished without attrition or actual contact of the surfaces of the rotor and stator. Action upon the surfaces of the rotor and stator is negligible.

Such method permits the disruption or grinding into the minutest particles, not only of solid substances, but also of insoluble waxes and greasy materials to a degree unknown and in most instances heretofore impossible.

Reference to a section of the mill (Fig. 1) shows that it consists of an outer casing which surrounds the rotor, R. This rotor consists of a perfectly smooth face upon the frustum of a cone. The arrangement and adjustable relation of the rotor R and the stator CS are suggestive of the clutch action in a motor car, except, while in operation, the aperture or clearance is fixed and the surfaces are never in actual contact. The clearance is always fine and varies from 0.002 inch upward, according to the materials and the desired degree of dispersion. The rotor in operation acts as a centrifugal pump and draws the materials continuously, and with great force, into and through the sub-chamber SC.

There are, therefore, two surfaces in exceedingly close proximity, while the speed of the rotor R may vary from 1000 to as high as 20,000 or more revolutions per minute, according to the size of the mill and the required peripheral foot second speed, essential in producing the proper disruption.

The mills are all furnished with steam jacket, so that heating or cooling may be effected during operation.

Operation

Liquids are easily fed to the mill by gravity or slight pressure, but solids for suspensoids or wet grindings must first have a primary grinding from 75 to 150 mesh. It is evident that the finer such preparation the more easily minute dispersion is obtained.

The materials are fed into the mill through the inlet I at a suitable rate, so that the sub-chamber SC is filled at all times. The supply may be furnished by slight gravitation (the usual method) or with a feed pump for viscous materials. The pump is often used for transportation and supply. Pressure feed, while not detrimental, is a useless high additional cost and non-essential for operation or results.

Many oils that will not flow readily require slight pressure to be applied for the feed. Oils of great viscosity resist being lifted by suction, owing to the high coefficient of friction; no greater velocity should be applied than is necessary to obtain the proper constant flow. The action of the rotor in lifting materials from the sub-chamber is similar to the centrifugal pump. Viscosity and the supply control are important features, and are governed by conditions such as temperature and chemical properties.

This mill is not an intermittent or "batch" machine, but is a continuous process, the 15-inch rotor type producing from 1200 to 1500 gallons per hour, varying with the viscosity of the oil and the weight, hardness and degree of dispersion of the suspended medium required.

For use in suspending coke in oil the action of the mill is exemplary and successful. For this class of work, excessive speed is not required, 1800 R.P.M. with the 15-inch rotor type giving the most satisfactory results.

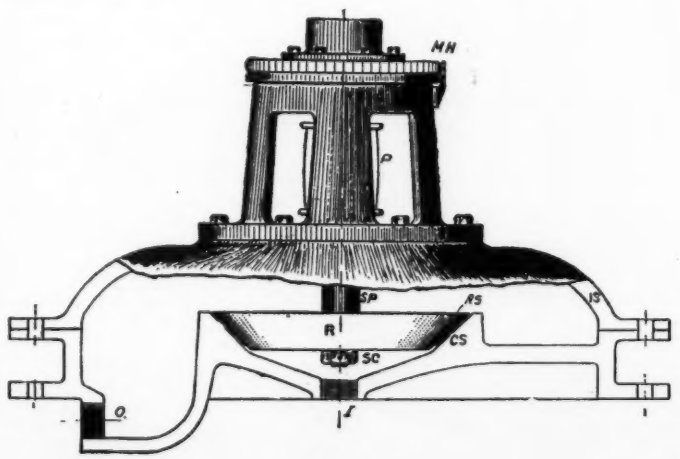

Fig. 1.

Heating and Cooling

Unlike beater mills, there is no rise of temperature from operation, and, therefore, a cooling system is not required.

The temperature, however, may be raised or lowered through the jacket, when required for running certain oils, in order to change the viscosity or to prevent hardening. Steam is the usual method of applying heat, but, in cases requiring accurate and uniform temperature, oil has been deemed preferable.

Action and Forces

The disruptive action of the mill has been described as the resolution of several forces in combination.

The disintegration is carried out by hydraulic forces, the film of liquid being actually sheared under conditions that do not permit of the liquid acting as a liquid, but as a solid, so that all particles in the line of shear must themselves become disintegrated during the shearing.

Solids, such as amorphous glass, corundum, iron oxide, felspar, sulphur, residual carbon, china clay, zinc oxide, graphite and similar substances run once through the mill show marked Brownian movement when viewed with the ultra-microscope equipped with a

dark, ground illuminator. With few exceptions, the size of all particles is less than one micron and varies downward to invisibility. The degree of fineness produced with the Premier Colloid Mill is not obtainable by any other grinding machine.

Chemical Reactions

The action of the mill being instantaneous, chemical reaction increasing as dispersion and interfacial area increase, such reactions are equally instantaneous. One example of this is the continuous process for separating carbolic and cresylic acids from tar oils. In this process use is made of the fact that when caustic soda and tar oils are passed through the mill, a temporary emulsion is formed and the caustic soda dispersed in an exceedingly fine state in the tar oil; with this enormous surface exposed, it combines immediately with the tar acids and the emulsions break down at once.

It is only necessary to pass the product, after it leaves the mill, through the separating column when the washed tar oils and carbolates and cresylates may be run off continuously. The carbolates and cresylates being much heavier than tar oils, sink to the bottom and the washed tar oil may be drawn off continuously from the top of the separating column. About 1500 gallons of tar oil may be treated in an hour with one 15-inch mill.

The same principle may be applied to the washing of free fatty acids from oils by means of caustic soda. In this case a more stable emulsion would form, since the products of the washing would be a soap. This may be avoided by dissolving in the washing liquor, before treatment, a cheap electrolyte such as common rock salt.

A similar process is the extraction of pyridine from tar oil and naphthas.

Dispersators

In the suspension of petroleum residue in various oils, sufficient acid is often contained in the residue to disperse and hold it in suspension. Experiments with acid dispersators show that in nearly every case the addition of a small amount of acid proves sufficient to effect the suspension. Only in rare cases has it been found that a stabilizer is necessary with the acid. The function of the dispersator is to put an electric charge on the particles. The electric effect of the mill, however, seems to eliminate the necessity of any great amount of such a substance.

Power Consumption

The drive is obtained with belt, direct-coupled vertical motor or steam turbine.

The table of tests for the 15-inch mill with belt drive, carried out in England within the past two months, is as follows:

Running empty, 3000 R.P.M., the mill required 2.5 kilowatts. The mill under water load, passing 1500 gallons per hour, shows a power consumption of 19.25 kilowatts. On this basis, under load per hour of from 1 to 2.5 tons solid matter, such as iron oxide, with water passage of from 3.5 to 5 tons, the power consumption is 19.25 kilowatts. While viscosity of the product will vary these figures somewhat, yet, for water grinding, as shown, the cost of solid matter per ton at 2 cents per kilowatt is from 16 to 40 cents, or 3.8 to 9.6 watt-hours per pound of solid, which includes the milling of from 3.5 to 5 tons of water.

In the production of emulsions, except in case of great viscosity, the power required is considerably less; and where pressure feed is required the mill load or suction lift is greatly reduced and consequently capacity is increased and power consumption reduced giving a lower cost. The cost of liquids based on 19.25 kilowatts per hour is 6.7 cents per ton or 1.6 watt-hours per pound. This low power cost is due to the high capacity in production.

In case higher speeds are required the power consumption increases, but all successful experiments on coke suspensions thus far have been carried out with a speed of 1800 R.P.M. with the 15-inch rotor type. This reduction in speed lowers the power consumption enormously. The foregoing figures, however, based upon water load and mill production of solids treated, should furnish a reasonable comparison between this mill and those of the "beater" type.

Industrial Applications

In the cracking of hydrocarbon oils, both crude petroleum and fuel, two products are obtained—cracked distillate and a heavy oil designated as residuum, residuum oil, cracked residuum and crude oil residuum. This residuum is a fuel oil of great economic value, but has one outstanding bad feature. During the cracking process a substance is formed in the oil having something of a coke or tarry nature, which may be called embryonic coke. This material passes into the residuum, but after a short period of standing settles out and becomes a hard mass. The difficulty encountered here in tank cars and other storage receptacles is apparent. All previous attempts to suspend this embryonic coke so that it would not settle out have failed until the Premier mill solved the problem commercially. Highly satisfactory results are obtained by merely passing the residuum through the mill once at a favorable working temperature and with the addition of a negligible amount of the dispersator.

Fig. 2

Besides suspending this embryonic coke already contained in the residuum, as much as 50 per cent by weight of both petroleum residue and breeze coke have been successfully suspended.

A speed of 1800 R.P.M. on the 15-inch rotor type gives the best results for this work.

Further applications of the mill are as follows:

The breaking down of natutral oil emulsions. Complete dehydration has been obtained by passing them through the mill once at a low speed and with the addition of a minimum amount of a cheap electrolyte.

The washing of the acids from residua and other materials.

The washing of naphthas and gasoline with sulphuric acid or caustic soda.

The intensive mixing and blending of oils of varying specific gravity and viscosity.

The manufacture of lubricating greases.

The suspension of flake graphite in oils and greases.

Creosoting in all of its phases. The saving caused by the production of a creosote emulsion enables this industry to enter a larger field of usefulness, since the cost of imported oil has prevented general use. The emulsion is stable, whether boiled or frozen. These emulsions are called "Creoloid."

Creosote stains—Emulsions in various colors for interior and exterior decorative purposes and wood preservation.

Hydroloid; Dust Laying Emulsions—These consist of water and oils, such as creosote or petroleum oils, pitch, asphalt, bitumen or petroleum residues. The great advantages of such dust layers, which are applied in the cold with the ordinary street sprinkling carts, are apparent. The cost per mile in England is 129 pounds sterling compared with 372 for water per season. This is a saving of 66 per cent and furnishes complete service as well as being beneficial to the road surfaces.

Road Binding Emulsions—The demand for road binders of the emulsion type has not, until now, been satisfied. The field is not only large, but an ever increasing one.

Waterproofings—Ideal emulsions are made from asphalt or pitch for treating damp courses, stone work and concrete. Such emulsions are also used for concrete floors in factories, etc.

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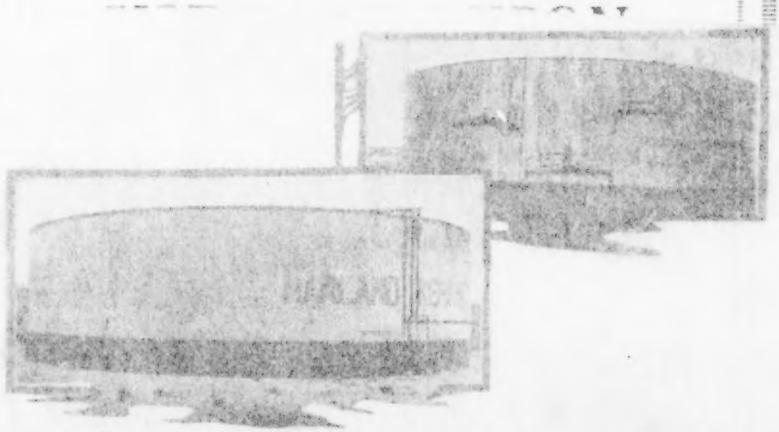


Top—Cleaning and welding shell of old tank. Bottom—Old tank after being welded.

Power Cost Reduced by Electric Drive

(Continued from page 14)

distillation, of course, but in removing impurities, that is applicable to some oils that must be perfectly dry and free of moisture. We have seen that moisture in superheated steam is also flashed into steam. In drying vegetable oils, that would form acids of decomposition if not dry, and discolor products into which such oils are manufactured, superheated steam when blown through such oil, naked, takes every vestige of moisture out with it, leaving the oil as dry as a powder horn. Water in greases may be removed and the quality of greases maintained uniformly in this manner. Since greases are made from animal and vegetable oils, in part, the oils would be dried first with superheated steam. Heat, so used in vegetable oils, has the peculiar property of not "burning" such oils; when heated to even say 450 degrees, with superheated steam being blown through, all impurities such as tar, which is found also in another form in vegetable oils, are removed. Some of these are condensed and used for water proof paints.

While the writer has designed and installed successful processes of this type, that have been in use for fifteen to eighteen years, the owners, selling their products under trade marks and being jealous of quality, regard their processes as secret and keep them in plants held against admittance by several successive locks and keys, still the foregoing is an outline of the principles that are successful, very much so, and that may be used in refineries making transformer oils and in grease plants troubled with water in their product.

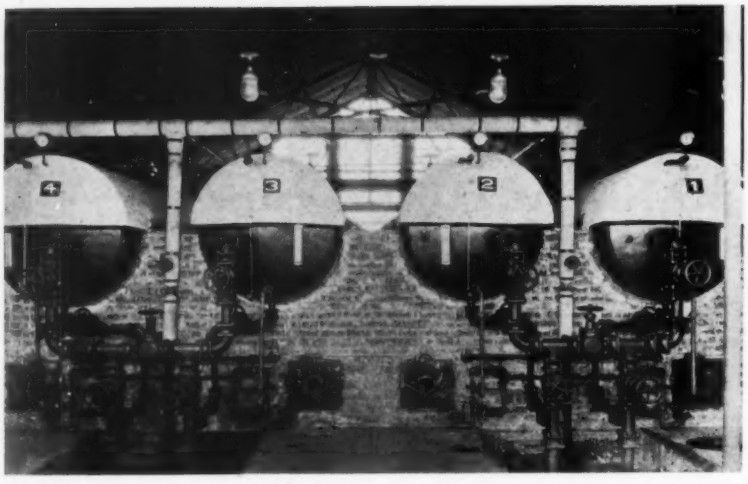
Equipment is peculiarly arranged and adapted, however, and only after much experimentation was the process made successful, and then only by the use of superheated steam.

This is only a side note, however, in the general subject of this article.

The plant arrangement outlined has been in successful use in several refineries for many years; the turbines had to be especially made in the beginning, but are now obtainable for any condition that may be required in a refinery. It might be stated also, that one refinery of some size, adjacent to the field, producing power in the manner outlined, would not buy outside power for oil field pumping at a price less than the central cost of production of off-peak power, because power so produced in that refinery is a by-product and the cost is not computed by fuel oil used, but solely by taking the fixed and operating charges, without fuel, on the capital investment necessary for the turbo-generators, from which has been deducted, however, the cost of additional boiler plant necessary for furnishing steam for process.

And where the boilers of a plant are carrying an overload, that reduces efficiency and deteriorates boiler equipment, the layout as outlined will enable taking much load from the boilers, and at the same time making all operations better performed.

WYATT METAL & BOILER WORKS



View of 4′ x 40′ Stills with one piece bottoms in plant of Roesser & Pendleton, Breckenridge

Another Wyatt's DALLAS Equipped Absorption Gasoline Plant

Californians Operate Gas Plant On Co-operative Plan

Long Beach, California, August 13.—Announcement was made recently by the Santa Ana Gasoline Corporation, of the completion of its plant No. 1, at Long Beach, Signal Hill district.

On its trial run, the plant demonstrated its efficiency and economy. The superintendent reported that the plant was tested out and started on approximately 2,000,000 cubic feet of natural gas for 24 hours. This was approximately 25 per cent low. Another innovation was in the use of absorption oil which has an initial boiling point of about 385 degrees F., the plant was started on oil using an initial of about 124 degrees. In order to get a complete initial in the absorption, the oil was circulated at 325 degrees F. This arrangement has proven very satisfactory and an excellent white gasoline that needs no treating or filtering is being turned out.

The financing and organization of the company is unique in that it is carried out along lines of a co-operative association. The stockholders divide all the net profits, pro-rata, among themselves every thirty days.

When the construction program has been completed, the company will have three plants in operation. Work has been started on Plant No. 2 already.

Fort Worth, Texas.—Materials have been ordered to rebuild the 300 barrel capacity Fleming cracking unit at the Star Refining and Producing Company's refinery near Fort Worth. This cracking unit was destroyed by an explosion early this summer, but the damages were covered by insurance.

electric charge on the particles. The electric effect of the mill, however, seems to eliminate the necessity of any great amount of such a substance.

Power Consumption

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The table of tests for the 15-inch mill with belt drive, carried out in England within the past two months, is as follows:

Running empty, 3000 R.P.M., the mill required 2.5 kilowatts. The mill under water load, passing 1500 gallons per hour, shows a power consumption of 19.25 kilowatts. On this basis, under load per hour of from 1 to 2.5 tons solid matter, such as iron oxide, with water passage of from 3.5 to 5 tons, the power consumption is 19.25 kilo-

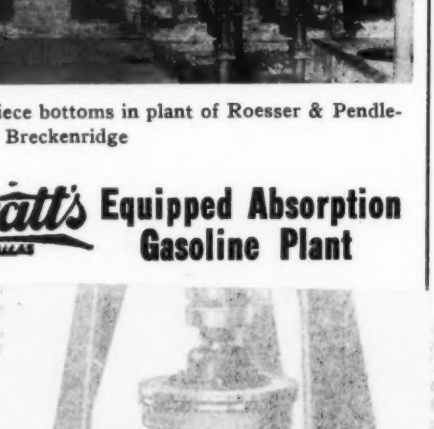
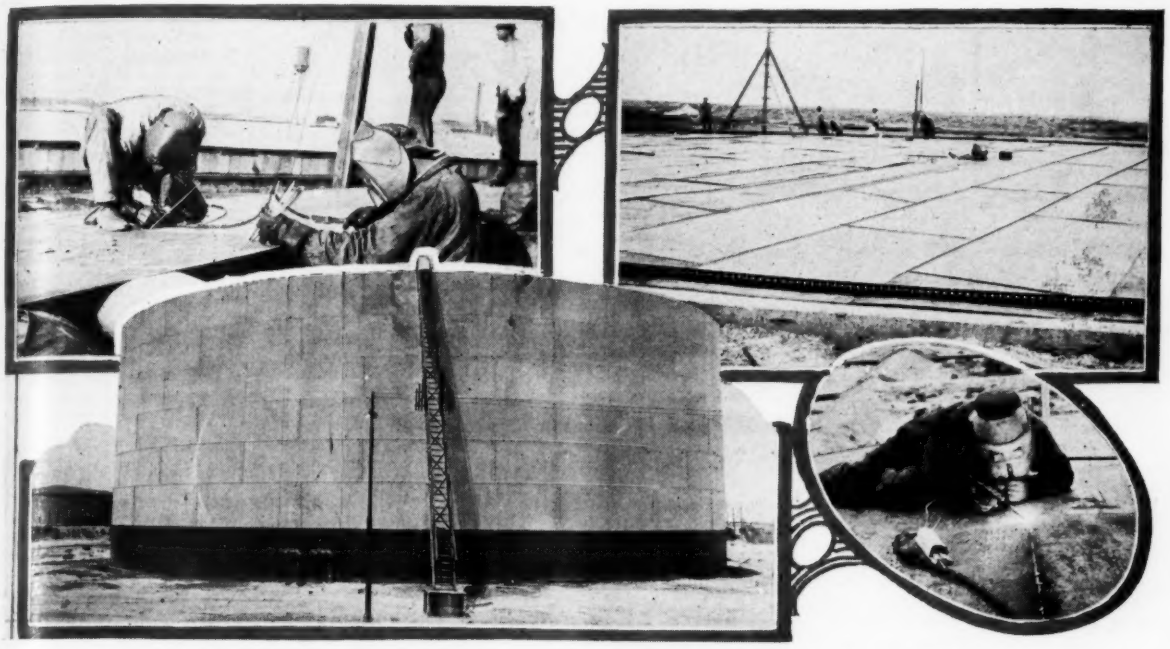


Fig. 2



Top left—Tacking first plates of new tank roof.
Top right—Bottom of new tank in place for welding
Lower left—New tank of welded construction.
Lower Right—Welder at work on new tank roof.

Welded Tanks Serve Export Station

Marland company gets vapor proof containers from old shells and new construction

ONLY welded storage tanks are used by the Marland Refining Company at is export bulk station at Texas City. Aside from the six new 80,000 barrel tanks of welded construction, the storage includes three old tanks, whose wooden roofs were replaced with steel, which was welded without rivets, while the bottom and sidewalls also were repaired by being welded.

Since the substitution of steel for wood on the roof and the welding of roof, bottom and sides converted three tanks into containers vapor proof and as nearly fire proof as construction can accomplish, the methods followed at Texas City are worth consideration. The work was done by the Welding Engineering Company of Bartlesville, Oklahoma. The Wilson Plastic Arc method was used, current being generated on the ground.

Welding the bottom of a tank already erected amounts to a repair job as well as an improvement in construction. After being cleaned, the bottom has to be scrubbed with wire brushes. Then all seams must be brightened with the sand blast. In addition to the seams, pitted places can be likewise cleaned and prepared, so they can be repaired with electric patch. With this preparation complete, the welding becomes a question of getting the metal to the proper places.

Scaffolds, supported by blocks and ropes, are necessary for preparing the walls of the shell, as well as completing the welding. These must be fixed so workmen can propel themselves up and down the tank shell as they work.

Welding Old Shell

Preparation of the shell requires the removal of all paint from the seams. After this the sand blast must be used to prepare the seams for the welding. In addition to welding all seams, many of the rivets must be welded to insure the best construction.

When a new steel roof is placed on a tank thus repaired and welded, the process is similar to that of constructing a roof on a new tank of welded type. No rivets are required. The plates are laid in place and then "tacked". Thus held, they are ready for the welders to complete the seams.

With all welding complete, a tank is ready for testing, which can be carried out with water as is common in testing tanks of riveted construction. Other than the welding, a tank of this type is finished as if riveted. The Marland Company has installed at Texas City the vapor valves manufactured by the Loop Steel Company. These maintain half ounce pressure or half ounce vacuum as conditions warrant, working automatically.

One advantage of welding a new tank is that it is not necessary to place the

Top—Cleaning and welding shell of old tank. Bottom—Old tank after being welded.

An unloading rack used at the Marland's Tidewater plant.

bottoms on trestles, as when they are riveted. The plates can be assembled on the ground at the tank site and "tacked" in place. When the edges are properly cleaned, the welding can proceed until each seam is a complete weld, leaving a one-piece bottom.

Erection of the shell follows methods identical with riveted construction. In addition to rivets, the seams are welded. Then the top can be welded in place, following the method of placing a new steel welded top on an old tank.

All Vapor Proof

The three tanks repaired for the Marland Company are each of 55,000 barrels capacity. They are used for handling crude oil through the export station. In addition to these, the plant has six new tanks of welded construction, each of 80,000 barrels capacity. Four of these are used for gasoline and two for kerosene.

The old tanks at the Marland plant were made vapor proof by the repairs and the welded seams. The work done at this Texas City station gave proof of the fact that a tank can be given a new roof and left in as good condition as a new tank.

The chief asset of welded tank construction is that the container is vapor tight. This leaves vents to take care of all "breathing" of the stock in the tank.

Another claim for welded construction is that the bottom will last longer than with riveted construction. Deterioration is more rapid around rivets than at any other point of a tank bottom. By eliminating the rivet, those familiar with welding claim it will leave a bottom of longer life.

Concerns having experience with welded tanks say the cost of that sort of construction is about equal to that of riveted construction.

The Marland plant at Texas City is built for export service on both bulk and barreled products. The nine welded tanks, two pump stations and the unloading rack with space for 75 tank cars make up the bulk products part of the plant. The barreling plant is under one roof, 100 x 750 feet.

Unloading Facilities

Because tank cars are unloaded at the plant but never loaded there, pipe facilities are especially designed for the one purpose. The unloading rack has 20 units, each having three intake pipes. One pipe is for crude oil, another for kerosene and another for gasoline. These units are between two tracks, on which cars can be spotted. It is possible to unload 20 cars simultaneously, as only two of the pipes can be used from one station, one to one track and another to the other side.

Pipes at the unloading units have two swinging joints, giving each an elbow effect for attaching to the bottom valve on a tank car. Each has a tank car connection.

One pumping plant is steam operated, this being used for crude oil unloading. The other pump station has electrical equipment. It is used on all products of high volatility.

These pump stations serve for loading boats at the docks near the bulk station. Ten-inch lines are run to the docks and boats can be loaded at 10,000 gallons an hour.

Natural Gasoline Men Will Combat Gasoline Stealing

Tulsa, Okla., July 8.—At a recent meeting of the Association of Natural Gasoline Manufacturers steps were taken to combat gasoline thefts.

Gasoline thieves are becoming numerous in many of the Mid-Continent fields and have made serious depredations in several districts.

The present law of Oklahoma provides that unless a person steals more than $20 worth of natural gasoline at one time it is only a misdemeanor, punishable by a fine of not more than $25.

It is the aim of the association to create public sentiment against this law until it will be changed so that stealing gasoline will be grand larceny.

Sullivan Announces Bulletins

Sullivan Machinery Company announces three new bulletins which are for free distribution.

Bulletin 77-H covers angle compound compressors; 70-X is devoted to compressed air spaders, and 78-B describes the Sullivan straight line steam driven and bolt driven vacuum pumps for vacuum service, equipped with wafer valves.

Copies of these bulletins may be had by writing the Sullivan Machinery Company, 122 South Michigan Avenue, Chicago, Ill.

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STOP PIPE CORROSION
IN SMALL LINES

Our Simplex Prepared Joint Cast Iron Pipe is made in 2″, 3″, 4″ or 6″ diameters. Since it has been available thousands and thousands of feet of this material has been used in the oil fields.

Illustration of section through assembled joint of Simplex Prepared Joint Five-Foot pipe, showing asbestos endless ring gasket in place. This gasket is adapted to use for oil, vapor and acid lines. A rubber gasket is compounded to suit the particular service it is to render—steam, natural gas, artificial gas, water, oil, etc.

Its chief advantage lies in its immunity from corrosion as compared with other ferrous pipe. Its desirability is further increased by the special joint, with only two bolts, and with a thick, endless ring gasket. It is rapidly and easily laid by inexperienced men.

Wherever permanent construction is desired, it is little short of an economic crime to spend money for a pipe line of perishable material when a practically permanent construction can be obtained by the use of cast iron.

Do you know why cast iron withstands corrosion so much better than any other ferrous metal? Our Bulletin No. 44 explains it.

Simplex Prepared Joint Pipe is furnished with a full line of fittings. The material is fully described and illustrated in our Catalog No. 48. Your copy is waiting to be mailed, upon receipt of your request.

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Branches at
Dallas, Kansas City, San Francisco, Los Angeles, Chicago, New York, Minneapolis

Write Also for Information on Our
Simplex Cast Iron Pipe for Oil Condensers

Present Refining Policies In California

(Continued from page 28)

tal kerosene market. The big end of this market is the export end and as just pointed out this is very quiet.

Excepting Fuel Oil the other petroleum products of California do not represent much volume or money. The unit price of lubricants is naturally very high as compared with the other products but the relative quantity sold is very small.

The fuel oil market has been very strong for the past year. For a long time stocks of fuel oil did not rise in the state of California despite the fact that perfectly enormous quantities of this commodity were being ground out daily by the various refining companies during the period of flush production through which the state has just passed. All through the peak of production in the summer and fall of 1923 fuel oil stocks in California held pretty close to the 40,000,000 barrel mark. Some months they would be a million or so more and other months a little less. However, since December 31, 1923, to June 30, 1924 (the latest date for which authentic figures are available), stocks of "Heavy Crude, heavier than 20° A.P.I. including Residuum", as reported by the Pacific Coast Office of the American Petroleum Institute have increased from 43,614,271 barrels to 49,080,055 barrels. This is a notable increase, particularly in view of the fact that fuel stocks showed no increase for such a long time before this six months period. Also, the increase is quite out of proportion with that of other petroleum products on the Pacific Coast.

So far there is no particular cause for worry as to the California fuel oil market. The bad influence of increasing stocks is to a large degree offset by a rapidly growing local consumption. In addition to this steady growth of demand there has developed during the past few months an emergency demand by power companies. Because of a severe drought in California the hydro-electric power industry has suffered severely. There has been a compulsory pro-rating of electric energy and all industrial consumers have been required to curtail their requirements by 25% of their usual consumption. This has been necessary even with the full and forced operation of all steam-electric plants. As far as the oil refining industry is concerned the principal result has been a great demand for fuel oil both from the power companies themselves and from the industries which have been unable to curtail their power requirements and have therefore had to replace the lost electric energy with fuel oil.

Summing it all up, it is plain to see that the technical policies and operating routine of the California refineries now as always are dictated by market requirements. This is the reason for all the stress which has just been placed on the present condition and future outlook of the oil market on the Pacific Coast. The present market allows the California refiners to operate in just one way and that is to cut a high grade gasoline, an unimportant amount of kerosene and other distillates, and to put practically everything else into fuel oil. Those refiners who are making lubricating oils are enjoying a fair market for their output but have had to cut costs by constantly improving their manufacturing processes. These lubricating oil manufacturing processes are still the subject of continuous research.

What the immediate future holds is pretty much of a mystery but there is little doubt but that it will soon be necessary to prepare for gasoline cracking operations. This despite the stocks of gasoline which have been steadily increasing from month to month and also in spite of what has been previously said about interest in cracking waning since the early part of the year.

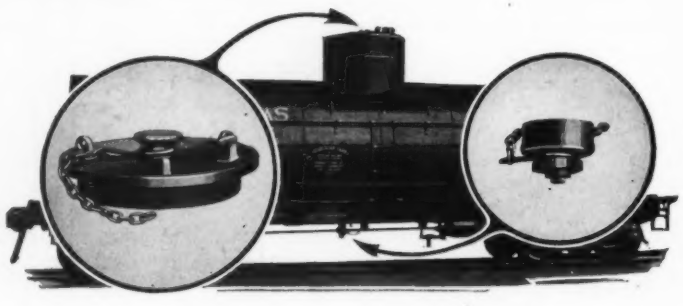
In the meantime the refining of California oil resolves itself largely into turning out the gasoline and fuel oil and selling as much of it as possible while hoping and scheming to find sufficient funds to store what can't be sold.

Natural Gasoline Manufacture

Within the past six months there has been very little change in the quantity of Natural Gasoline produced in California. The volume of wet natural gas has gone down enormously but there is very little of it blowing to waste now and it is getting richer all the time.

In this business, as in oil refining, there is little going on in the way of new construction. Several plants have been moved to new locations in order to secure an adequate gas supply. Also, the Pacific Gasoline Company has built two new plants which are being operated on gas passing through the mains

(Continued on page 48)



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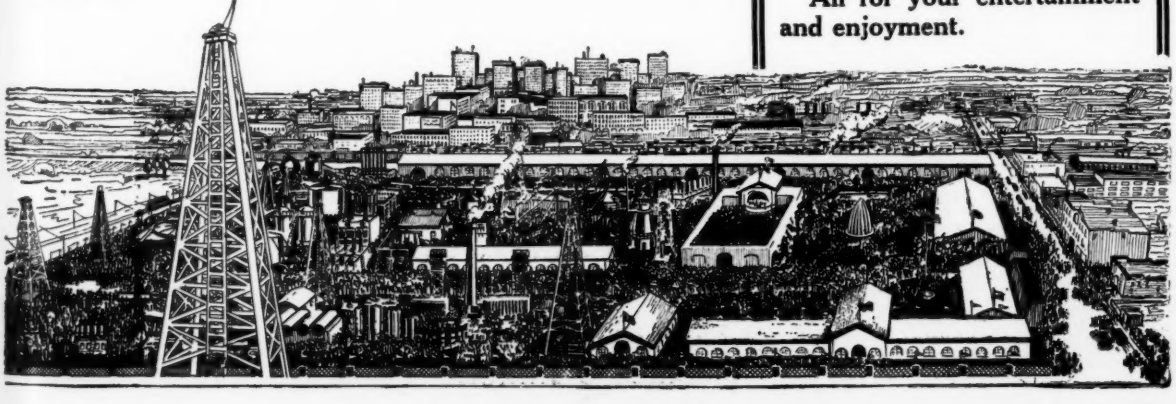

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RECENT REFINERY PATENTS ISSUED

BY STAFF REPRESENTATIVE

Washington, D. C.—The following patents of interest to the oil refining industry, were issued by the United States Patent Office during the month of July:

No. 1,500,040, issued July 1 to John Joseph Allinson, Bartlesville, Okla., assignor to Doherty Research Co., New York, for a process of distilling oil, comprising the heating of petroleum oil, passing the heated oil through a series of compartments maintained under a partial vacuum, finely dividing said oil at the points of its admission to said compartments, vaporizing the lighter portions of the oil enclosed in said compartments by the vacuum in said compartments, separately withdrawing vapors directly from each of said compartments out of contact with the oil in said chamber and condensing the said vapors.

No. 1,500,202, issued July 8 to Earl Petty, Winfield, Kans., assignor to The De Laval Separator Co., New York, for a process of purifying mineral oil which comprises establishing a flow of an emulsion of mineral oil and a contami-

[redacted]

J. S. COSDEN
Who recently resigned as president of Cosden and Company

Cosden & Co., West Tulsa	35,000	16,000
Cushing Refining & Gasoline Co., Cushing	2000	400
Cushing Refining & Gasoline Co., Blackwell	1000	650
Daisy Bell Petroleum Co., Wilson	2000	100
Empire Refineries, Cushing	7000	5000
Empire Refineries, Okmulgee	2500	2500
Empire Refineries, Ponca City	6000	5600
Garber Refining Co., Garber	3000	1600
Globe Oil & Refining Co., Blackwell	5000	2450
Hewitt Refining Co., Hewitt	1800	700
Illinois Oil Co., Cushing	2500	1500
Imperial Refining Co., Ardmore	6000	4350
Johnson Oil Refining Co., Cleveland	4000	3200
Lorraine Refining Co., Bristow	4000	2200
Marland Refining Co., Ponca City	15,000	11,000
Nyanza Refining Co., Wilson	3500	700
Oil State Refining Co., Enid	2000	750
Oklahoma P. & R. Corp., Muskogee	2500	2000
Okla-Tex. Ref. Co., Granfield	2000	2200
Waite Phillips Co., Okmulgee	6000	4150
Peppers Gasoline Co., Covington	1000	400
Pierce Oil Corp., Sand Springs	10,000	rerun

pors upwardly through successive transverse layers of downwardly flowing hot oil.

No. 1,501,881, issued July 15 to Philander L. Bennett, Chicago, for a shale retort comprising an elongated housing, a plurality of heating coils disposed therein, a distillation plate extending longitudinally within said housing and spaced slightly above said heating coils, a conveyor consisting of a chain-like netting movable longitudinally upon said plate in the interstices of which the shale is deposited, shovel blades mounted in said conveyor transverse to the plane of movement of the latter, said blades and netting coacting to move the shale upon said distillation plate, a plurality of scrapers arranged transversely of the length of said plate and positioned in a horizontal plane slightly above the upper edges of said shovels, and vapor outlets leading from said housing whereby the products of distillation are withdrawn.

No. 1,503,093, issued July 29 to Robert M. Catlin, Franklin, N. J., assignor to Catlin Shale Products Co., Wilmington, Del., for a shale-distilling apparatus consisting of a receptacle for the shale charge having a perforated inner lining spaced from the outer wall of the receptacle to form an annular space for the escape of gas, and having a shale-charging opening and discharging opening for solid products, of means for closing said openings, means for conducting away gas from the annular space, means for heating said gas, a perforated pipe arranged to discharge said heated gas along the interior of the shale charge so that the gas may travel radially through the charge to the perforated lining, and means for drawing off the liquid products of distillation.

No. 1,503,234, issued July 29 to Daniel H. Francis, Grand Junction, Colo., for a shale retort comprising an enclosed heated shale receiving bed, means for depositing shale, centrally of said bed, a large horizontally disposed wheel above said receiving bed and having spokes of a configuration to cause shale to be distributed from the central portion of said bed to the marginal portion thereof, and means adapted to successively scrape the spokes of said wheel.

Peerless Oil Refining Co., Chanute	3500	1600
Red Bird Refining Co., Fredonia	200	150
Roxana Petroleum Co., Arkansas City	15,000	10,650
Sinclair Refining Co., Coffeyville	6500	4700
Sinclair Ref. Co., Argentine	8000	4200
Skelly Oil Co., El Dorado	14,000	12,000
Standard Oil Co., (Kansas) Neodesha	12,000	6000
Vickers Petroleum Co., Potwin	1800	1750
White Eagle Oil & Ref. Co.	7500	5200

MISSOURI

Wilhoit Refining Co., Joplin	1500	1000
Standard Oil Co., (Indiana) Sugar Creek	15,000	8000

NORTH TEXAS

American Oil Corp., Pioneer	2000	SD
American Refining Co., Wichita Falls	7000	5600
Boardman Oil Co., Wichita Falls	750	200
Buffalo Refining Co., Sherman	500	300
Clayton Oil & Ref. Co., Dallas	4500	3000
H. H. Cross Ref. Co., Corsicana	2500	1250
De Leon Refining Co., De Leon	1000	300
Griswold Oil Co., Wichita Falls	3000	2000
Gulf Ref. Co., Fort Worth	15,000	6000
Humble Oil & Ref. Co., Burkburnett	1500	1500
Humble Oil & Ref. Co., Hearne	6500	6500
Iowa Park Prod. & Ref. Co., Iowa Park	2000	1900
Miller Petroleum Co., Wichita Falls	4500	3250
The Petroleum Corp., Electra	2000	1000
Primrose Refining Co., Wichita Falls	1500	1050
Producers Refining Co., Gainesville	5000	4000
Rinehart Petroleum Co., Iowa Park	2000	rerun
Star Refining Co., Fort Worth	1500	600
Sunshine State Oil & Ref. Co., Wichita Falls	2500	850
Tidal Western Ref. Co., Burkburnett	3000	1100
The Texas Co., Dallas	15,000	8000
Texhoma Oil & Ref. Co., Wichita Falls	7000	6500
Transcontinental Oil Co., Fort Worth	5000	2500
Travis Ref. Co., Burkburnett	1000	200
Waggoner Refining Co., Electra	3400	2450
White Eagle Oil & Ref. Co., Fort Worth	5000	2600

ARKANSAS

Cross Refining Co., Smackover	2000	1400
Continental Oil & Gas Co., Texarkana	750	400

JACOB FRANCE
Who has been elected to succeed Mr. Cosden as president of Cosden and Company

Improvements contemplated for the refining plant at Imperoyal, N. S., of Imperial Oil, Limited, will entail an expenditure of upwards of $200,000.

Name and Location—	Capacity	Running
Four States Ref. Co., Texarkana	2000	150
Home Oil & Ref. Co., Camden..	750	750
Kettle Creek Refining Co., Pearson	4000	3300
Lion Oil & Ref. Co., Eldorado..	12,000	6450
Ouachita Valley Ref. Co., Pearrado	1500	rerun
Pine Bluff Ref. Co., Pine Bluff..	2000	500
Root Refineries, Eldorado	3000	1850
Union Pipe Line & Ref. Co., Eldorado	4000	500
NORTH LOUISIANA		
Caddo Central Oil & Ref. Co., Shreveport	3500	3200
Caddo Central Oil & Ref. Co., Shreveport	8000	4500
Louisiana Oil Ref. Corp., Shreveport	10,000	10,000
Louisiana Oil Ref. Corp., Bossier	3000	600
Shreveport Prod. & Ref. Corp., Shrevepo	5000	3500
The Texas [illegible]	5000	3000

Standard of New Jersey Makes Statement On Official Opinion of Pending Suits

What may be considered an official expression of opinion regarding the so-called patent suit filed by the federal government against a number of the larger companies is the following which was carried in a recent issue of The Lamp, official publication of the Standard Oil Company (New Jersey):

"The Standard Oil Company (N. J.) is one of half a hundred defendants named in a petition in equity alleging a conspiracy, combination and monopoly in gasoline filed by the attorney general of the United States. The charge is based on alleged pooling of patents for cracking.

"It would be idle to say that this company welcomes such a suit. It does not, for it means a heavy burden of expense both to the companies named and to the federal government, and protracted litigation.

"The Standard Oil Company (N. J.) is not a party to any contracts in relation to patents or anything else which could possibly be interpreted as conspiracy to effect a monopoly.

"The burden of the government's complaint (which is based entirely on the patent situation) is that in the first instance there are no really important valid patents on cracking—and in the second instance, that the defendants have sought to magnify unimportant patents and to prevent the adjudication of invalid patents by agreements among themselves—all with the purpose of restricting gasoline production and maintaining high prices.

"The first means, in substance, that the patent office has utterly failed to perform its functions; that when it issued to this company the patents which it holds it wrongfully issued them. That when it issued to others their patents on which they sued or threatened to sue this company—it wrongfully issued those patents. If this be true, then the petition in effect alleges that through the mistakes of one branch of the executive department, the whole oil industry has been plagued with litigation for ten years, that it needlessly paid out royalties to the fortunate beneficiaries of these governmental mistakes—so that when certain companies sought to find a workable road out of the tangle by agreements rather than by unending litigation, they merely fell afoul of another branch of the executive department.

"The problems presented by the patent situation on cracking have been intermittently aired in the trade press through a period of years. The views of this company of these problems and the working out of its policy of live and let live as a solution of the matter were fully covered by The Lamp in the issues of October, 1922, and December, 1923.

"Successful large scale cracking of heavy oils to produce gasoline represents the greatest chemical achievement of this generation.

"Up to this time the government's only contribution has been through its patent office. It has complicated the legal situation and exposed everyone who cracked oil to unmeasurable hazards.

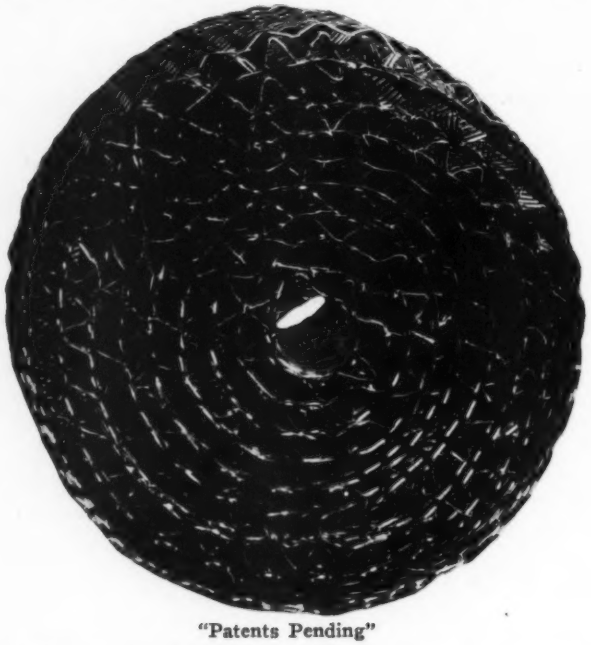
"Its second contribution—represented by this suit—may be either an effort to convert bad into worse by overturning the agreements by which alone the industry was able to cut short the endless course of litigation—or it may be a sincere effort to aid in clarifying the situation. Although we doubt the practicability of the course followed, it is at least commendable in spirit if the latter is its true purpose.

"The press comment stirred up by the suit is largely made up of speculation as to the extent to which the royalty

Foster Baffle

For

Absorption Gasoline Plants



"Patents Pending"

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It Will Mean—

(1) Less idle time for the stills
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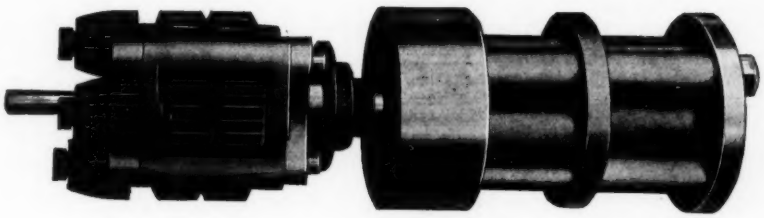
This can be brought about through the use of



Roto Tube Cleaners

They are low in first cost and are inexpensive to keep up.

Let us give you the benefit of our wide experience in the cleaning of cracking stills. Our catalog contains some valuable information—write for your copy.

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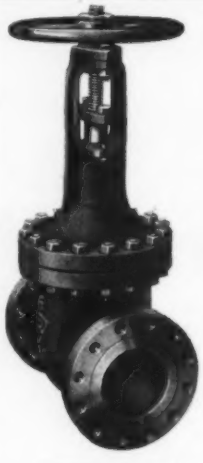
collected by various owners of cracking precesses enters into and so increases the price of gasoline. All that needs to be said on this ground is that the maximum royalty charged, as far as we know, has been less than seventeen cents per barrel of oil handled. In our case this royalty has never exceeded ten cents per barrel.

"The public does not understand or appreciate the benefit that it has derived, first from the development of the cracking process, and second from the willingness of the owners of the patents involved to have other refiners make use of them. Had the patentees followed the course which is contemplated and permitted by the constitution and patent statutes, and restricted the use of patented improvements to their own plants, the country would have experienced a shortage of gasoline long since, with a consequent advance in price far and away above any addition which has been due to the payment of royalties. Because the owners of these patents have made the new processes available to all on reasonable terms, the percentage of gasoline recoverable from a barrel of crude oil has been increased two and one-half times and the world's enlarged requirements met."

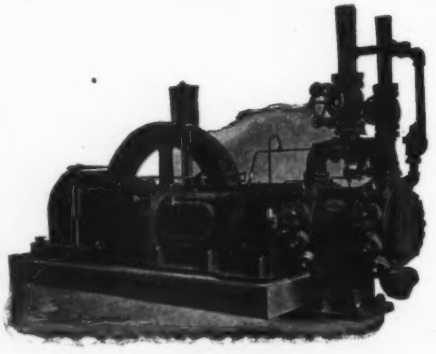


READING
400 POUND W. S. P.
CAST STEEL
GATE VALVES

These valves are made to the new A. S. M. E. standards for flanged cast steel valves and fittings. Reading flanged cast steel fittings are made in all classes of the new standards.

Reading Steel Casting Co.
READING VALVE & FITTINGS DIVISION
Bridgeport, Conn.
Stocked by: Norvell-Wilder Hardware Company, Beaumont, Houston, Mildred and Shreveport
Grinnell Co. of the Pacific, Los Angeles, Cal.

Vilter Ammonia Compressors Fittings and Pipe Coils
Render Years of Reliable Service



Compressors built in several types and a great variety of sizes. Illustration is of a high speed type compressor.

Complete Data on Request

THE VILTER MFG. CO.
Established 1867
1152-1162 Clinton St. Milwaukee, Wis.

BRANCH OFFICE
413 Com'l Bank Bldg.
Houston, Texas

Rapid Progress Being Made On Exposition Buildings

Tulsa, Okla., Aug. 14.—Rapid progress is being made on the construction of the three new steel buildings and the three arcades, at the grounds of the International Petroleum Exposition. With the seven buildings now on the grounds, these will house the commercial, scientific, technical and historical exhibits, while three acres of open space will accommodate the heavier type of oil well and refinery equipment.

Foundations for the new buildings are laid, and work upon the superstructure has progressed rapidly. The permanent buildings on the grounds are of brick ideally suited to exposition purposes, needing only re-flooring, decorating and a few minor improvements.

Contracts were signed last week for the construction of 450 exhibit booths within the buildings and the 600 feet of arcades, and they will be installed as soon as condition of the buildings permits. The booths will be built of white wood framework and paneling of apple-green sheetrock, in keeping with the exposition colors, green, white and gold. They are constructed with a panel 5 feet in height and 10 feet wide in the back, side panels 4 by 4 feet, and a wood railing at the front. The railings and side panels may be omitted at the wish of the exhibitor.

Another Gasoline Plant Planned for West Texas

Breckenridge, Texas.—The Hurley-Texas Gasoline Company of Tulsa has placed orders for materials to erect a natural gasoline manufacturing plant near Breckenridge. This plant will be equipped to handle about 2,000,000 cubic feet of gas daily, and will cost approximately $50,000. The absorption process will be used. This company is operating one natural gasoline plant near Breckenridge.

Catalog on Welding Equipment

The Oxweld Acetylene Company, Long Island City, Chicago and San Francisco, has just published a new 48-page catalog illustrating and describing in detail its extensive line of acetylene generators and oxy-acetylene welding, cutting, brazing, lead burning, heating and decarbonizing equipment. Copies of the book will be sent to anyone writing the Oxweld Acetylene Company, Thompson Avenue and Orton Street, Long Island City, New York.

New Field Offers Site For Gasoline Plants

Fort Worth, Texas.—The Big Lake oil field in Reagan County section of West Texas now offers a new field for the expansion of the natural gasoline industry, and the Big Lake Oil Company of San Angelo, Texas, and Pittsburgh, Pa., which has completed nine oil producers with about 3,000,000 cubic feet of gas production, has tentative plans to erect the first natural gasoline plant in the near future.

Proven Right from the Start!

A report of how a large company got started on a profitable gasoline plant.

President: Mr. Jones, we are about ready to decide on that gasoline plant.

Engineer Jones: I've made my own survey of the proposition and have had the Hope Engineering and Supply Company make an independent report. Their engineers have made a complete analysis of the proposition—the gas available, gasoline content, equipment required, investment cost, production, and an estimate of the income to be anticipated. I've made their recommendation the backbone of my report. Here it is—

President: (after reading) Fine! I know we'll vote to go ahead right away.—But how? You can't drop your work—we can't spare you.

Engineer: I believe we ought to put the whole thing in Hope's hands. They are better equipped than we are—or anyone else I know of. They know plant design, know what equipment is necessary, the proper proportions—at any rate they'll submit the plans for our OK. They have a construction organization available and can save us money on buying equipment, too. I feel that they will build us a plant for less money and get it going quicker than we can ourselves.

President: You're right! They have made a wonderful reputation, haven't they—50 or 60 plants and every one a credit to their Company. Let's get a Hope man down right quick to get things going.

Engineer: Miss Smith, put in a long distance call for the

ENGINEERS CONTRACTORS **HOPE** Engineering & Supply **COMPANY** DESIGNERS MANUFACTURERS

MT. VERNON, OHIO, U. S. A.

First Six Months Indicates New Record for Texas Gasoline Output

Fort Worth, Texas.—Shipments of natural gasoline from the various manufacturing centers in North and Central Texas during the first six months of 1924 amounted to approximately 2,502,108 barrels, or reduced to gallons places the totals slightly in excess of one hundred million gallons. The same district reported shipments aggregating 4,424,894 barrels, or 185,845,548 gallons during the entire year of 1923. The monthly average for the first six months of this year amounts to 17,514,756 gallons, while the monthly average for 1923 was placed at 15,487,129 gallons, thereby indicating that a new record for natural gasoline production and shipments is promised for this year.

Natural gasoline shipments have shown a steady decline since last March, when a new high record was established for the state with a total of 18,393,690 gallons, but this decline is largely due to unfavorable markets and usual reduced production during the summer months, owing to evaporation losses. Except for the short month of February, shipments dropped to the lowest level for the year during June, with a total of 16,872,450 gallons, and this drop came in the face of additional plants being placed into service in some of the Central West Texas fields.

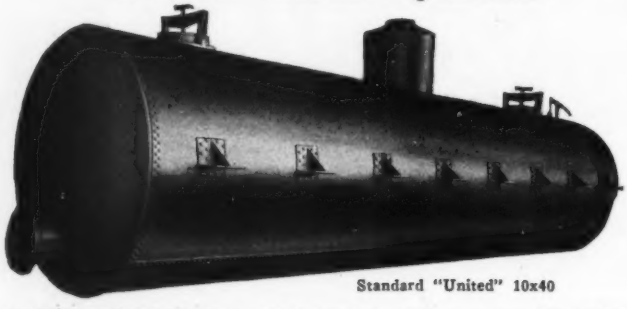
Construction work in the natural gasoline industry has been reduced to a minimum in recent months owing to market conditions, and absence of any appreciable amount of new gas production. The general curtailment of drilling operations is responsible for the decline in new gas production, while the proration of crude runs by several of the major companies is also reducing the gas supply of a few of the plants.

Shipments of natural gasoline from the various manufacturing centers in Texas during June and the totals for the first half of 1924 follow:

Fields—	June	Totals Past Six Months
Ranger-Eastland-Pioneer	90,920	691,965
Stephens County	121,480	677,571
De demona-Gorman	72,775	491,315
Burkburnett	63,000	364,295
Electra	20,030	124,481
Shackelford County	14,025	62,930
Young County	12,965	52,740
Petrolia-Clay County	4,800	27,320
Brown County	1,020	5,297
Amarillo-Potter County	710	4,190
Totals in bbls. (42 gals.)	401,725	2,502,108

Special Built Or Standard

"UNITED" is Most Dependable



Standard "United" 10x40

A reputation gained through uninterrupted service to the Oil Industry has proven the merit of "United" Equipment. "United" Still Construction is symbolic of this reputation. Let us quote you on your requirements. Literature sent upon request, no obligation.

United Iron Works, Inc.

DALLAS KANSAS CITY, MO. TULSA

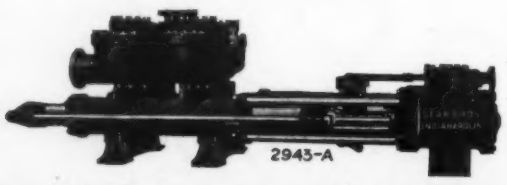
When better construction is offered it will be "United" Design.

DEAN BROS. CO.
INDIANAPOLIS.

OIL PUMPS
For Hard Continuous Service

The pumps will not short stroke. Are substantially and carefully built. Have large and free passages which do not restrict the flow. Extremely economical in the use of steam.

Send for Catalogue.



A. Y. McDonald Company to Have Pacific Coast Office

The A. Y. McDonald Manufacturing Company of Dubuque, Iowa, has recently completed arrangements with the U. S. Flexible Metallic Tubing Company, of San Francisco, Los Angeles and Seattle to handle for the Coast territory the A. Y. McDonald Manufacturing Company's complete line of oil equipment.

T. J. Stephens is president of the U. S. Flexible Metallic Tubing Company, with headquarters at the company's San Francisco office, 65 Main Street. F. A. McDonald is in active charge of the business at the San Francisco office, while M. F. Cralle shoulders the responsibilities of the Los Angeles office, located at 336 South San Pedro Street. Norman Campbell takes care of the selling end. J. A. Strehlow is manager of the Seattle branch, located at 110 Main Street.

The A. Y. McDonald line comprises practically all items of oil handling equipment used by jobbers and many items used by refiners and natural gasoline manufacturers. The company is said to be the world's largest maker of swing joints.

Sunburst, Montana. — Satisfactory progress is reported on the construction of the refinery being built here by the O'Neil interests. It is understood that present plans call for a plant with an initial charging capacity of upwards of 2500 barrels daily.

Many Thousands of Acres of Proven Gas Leases

Natural Gasoline Supply Assured for Years

The Chestnut & Smith Corporation owns gas rights on thousands of acres of land which have been drilled and which are known positively to be proven gas territory. As the gas pressure from the wells now producing declines, additional wells will be drilled and the supply maintained without interruption. This program insures a supply of natural gas for our plants for years to come.

NATURAL GASOLINE GRADES MANUFACTURED BY CHESTNUT & SMITH CORP.

Natural Gasoline

GRADE "A"	Gravity	Not below 72° Be
		Not above 78° Be
		Not over 375° F
	Recovery	Not less than 90%
GRADE "B"	Gravity	Not below 76° Bt
		Not above 82° Be
	E. P.	Not over 375° F
	Recovery	Not less than 85%
GRADE "C"	Gravity	Not below 80° Be
		Not above 88° Be
	E. P.	Not over 350° F
	Recovery	Not less than 78%
GRADE "D"	Gravity	Not below 88° Be
		Not above 92° Be
	E. P.	Not over 350° F

Motor Natural Gasoline

GRADE "1"	Gravity	Not below 58° Be
		Not above 62° Be
	E. P.	Not over 437° F
	Recovery	Not less than 91%
GRADE "2"	Gravity	Not below 58° Be
		Not above 62° Be
	E. P.	Not over 450° F
	Recovery	Not less than 90%
GRADE "3"	Gravity	Not below 64° Be
		Not above 66° Be
	E. P.	Not over 440° F
	Recovery	Not less than 88%
GRADE "4"	Gravity	Not below 66° Be
		Not over 70° Be
	E. P.	Not over 435° F
	Recovery	Not less than 85%

Chestnut & Smith Corporation

General Offices: Chestnut & Smith Building, Tulsa, Oklahoma

THERMIT

The Advantages of Thermit Welding for Pipe Lines and Coils

No. 5

On long lines or coils, the fact that it is not necessary to rotate the pipe while the weld is being made is only one of the advantages of Thermit Welding. The labor costs are reduced to a minimum.

Send for Pamphlet No. 1628 which describes the many other advantages.

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Channels, Angles, Roofing, Burner Pipes, etc. We are specialists in Carbon Black Building Material. Most of the buildings in Monroe, La., gas field and Stephens County, Texas, came from us.

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CARLOTS - CONTRACTS - LESS CARLOTS
Stocks—Tulsa, Houston, Dallas, San Antonio and Wichita Falls.
PHONE E 5641
JOE BARLOW, Distributor
DALLAS, TEXAS
2507 HARRISON ST.

Present Refining Policies in California

(Continued from page 36)

of one of the big gas marketing companies. While the gasoline content of this gas is very low the quantity of gas available is so great that a good production is obtained. With these exceptions, as mentioned above, there is no new construction under way. On the other hand there are a number of well designed and constructed plants standing idle which could be purchased at rock bottom prices. In addition there is a very large amount of miscellaneous material such as heat exchangers and the like available.

Natural Gasoline manufacturers in California at present find themselves in a rather uncertain position marketwise. The price level is approximately that of a year ago, viz. 10 to 11 cents per gallon. Last year at this time the market looked strong. Yet by the end of September it began to break badly and by November had reached 4 cents per gallon with no purchasers. The question agitating the gasoline men at present is whether this performance is to be repeated this year. There is a possibility that it may. The probability is, however, that the price of Natural Gasoline is pretty well pegged at present levels because of contracts already entered into which will hold through the winter. Two of the biggest oil marketing companies have stepped out during the past few weeks and tied up the output of the biggest gasoline plants. This will undoubtedly do much to stabilize the market. It therefore looks that although some loose distress gasoline may be offered during the period of slack demand from fall to spring inclusive there will not be enough of it to stampede prices generally as was done last year.

From the operating viewpoint all this means that there will be little new development for a while because there are no worthwhile gas supplies available to extract gasoline from. Present plants will be kept in operation as long as their gas supply lasts. New construction will take place as soon as additional gas becomes available at Dominguez and new gas is brought in at Rosecrans. Incidentally there is already one small plant in operation in this new field. It is the intention of the owner, the Cowan Oil and Refining Company, to expand it as rapidly as necessary to take care of new gas as it is brought in.

There have been few notable technical developments in the California Natural Gasoline industry during recent months. Stabilizers are beginning to be used with good success and a number of refinements in the distillation of gasoline from fat absorption oil are being generally discussed. Otherwise nothing particularly noteworthy seems to be taking place which has become general information.

New Lubricating Plant

Wood River, Ill.—Plans are under consideration for the construction of a new lubricating oil plant here by the Roxana Petroleum Corporation, subsidiary of Royal Dutch-Shell, to cost upwards of $1,000,000.

Phillips Co. to Enlarge Instead of Rebuilding

Ranger, Texas.—Instead of rebuilding its natural gasoline manufacturing plant that was practically wrecked by fire last June in the Pioneer field, the Phillips Petroleum Company has diverted the gas production to another one of its trio of plants in this field and will enlarge the capacity of same with the salvageable machinery from the burned plant. Phillips purchased the only three plants in the Pioneer field early this spring, and the one that caught fire was formerly that of the McMan Oil and Gas Company on the J. N. Gooch lease, while the plant to be enlarged was formerly known as the Brown Gasoline Company and later the Helious Gasoline Company. Gas production in the Pioneer field is on the decline, and can be easily handled in two plants.

Explosion Causes Damage

Wichita Falls, Texas.—Explosion of a gasoline tank at the American Refining Company's natural gasoline plant in the Burkburnett field on July 27 fatally burned a tenant in a nearby house, and damaged the plant to the extent of about $10,000. The cause of the explosion was not fully determined. The plant is to be rebuilt immediately, while in the meantime the gas production is being diverted to another nearby plant, which was not operating to capacity.

Work Progressing

Philadelphia, Pa.—Progress so far made on the new 10,000 barrel refining plant of Sinclair Refining Company being erected at Marcus Hook indicates that the work probably will be completed around December 1.

POSITION WANTED

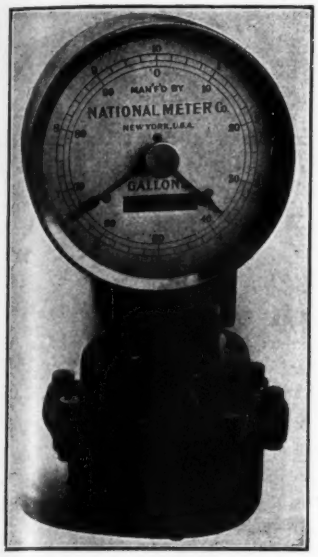
By first-class light oil and high pressure stillman; 32 years of age and married. Am at present employed; have good reasons for desiring change. Can furnish good reference. Prefer Texas, Oklahoma or California. Address Box 97, care REFINER.

TANK CARS WANTED

Will Buy for Cash or Lease

up to 200, eight and ten thousand gallons capacity. Quote best prices, giving age, name of builder, location, truck capacity; state condition, clean or dirty, and how equipped as to safety valves and coils. J. F. Varcoe, 165 Broadway, New York City.

Electrically Driven Centrifuges
Hand Centrifuges
WRITE
WILLIAMS, BROWN & EARLE, Inc.
Manufacturers of Laboratory Apparatus
918 Chestnut St. Philadelphia, Pa.



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OSCILLATING PISTON TYPE

Unequaled for accuracy and endurance
in every branch of oil measuring work.
The EMPIRE Stays accurate.

MADE IN ALL SIZES 5/8" to 6" INCLUSIVE

The design of the EMPIRE is different from that of every other type of oil meter. It has held a record for over forty years as the best and longest wearing liquid measuring device on the market.

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GENERAL AMERICAN TANK CAR CORPORATION

Pioneers in Tank Car Service

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Our permanency established through our record of twenty-four years of satisfactory service to shippers under all conditions at any and all times.

Our fleet of over twelve thousand Tank Cars enables us to deliver promptly at any time or place, the equipment to meet your particular needs.

Long or short time leases at reasonable rates

Call on us for your requirements, whether building new cars, leasing, repairing or rebuilding

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Refiner's Supplies

	Aug. 16
Soda Ash light 58%.....cwt.	$1.38
Silicate of Soda 60 deg. bbls. .....cwt.	1.70
Sal Soda wks .....cwt.	1.10–1.25
Caustic Soda 76% .....cwt.	3.10
Chloride of Lime solid .....cwt.	1.90–2.10
Sulphuric Acid 60 deg.tank cars f.o.b. shipping point per ton	9.00–10.00

Benzol—

Pure Water White	
Tanks .....gal.	.24 —.25
Drums .....gal.	.30 ....
90%	
Tanks .....gal.	.23 ....
Drums .....gal.	.28 ....

Jobbers' Supplies

Vegetable Oils—

*Linseed, carloads Spot....gal.	$1.00
June-August .....gal.	1.00
Less carload Spot.....gal.	1.02
5 bbls. or less Spot.....gal.	1.04
Boiled, tank Spot.....gal.	.95
Boiled, carloads Spot.....gal.	1.03
Soya Bean Spot, Tanks....lb.	.10¾

Animal Oils—

English Degras .....lb.	.05¼
Domestic Degras bbls. carloads .....lb.	.05
Horse .....lb.	.08

Oleic Acids—

Dist. .....lb.	—.08¾
Saponified .....lb.	—.08¾

Lard Oils—

Prime

Winter

Strained

....1 to 1½ ffa. 40/45c. t. lb.	.16⅛

Extra

Winter

Strained

....2 to 4½ ffa. 40/45c. t. lb.	.14¼
Extra ....4 to 5 ffa. 40/45c. t. lb	.13¼
Extra No. 1 .....7 to 10 ffa. 40/50c. t. lb.	.11¾
Extra No. 1 ....15 to 18 ffa. 40/50c. t. lb.	.11¼
No. 2..22 to 23 ffa. 40/45c. t. lb.	.11
Prime Edible Tallow under 1⅞ ffa. 40/45c t. N. Y.....lb.	—.09
Tallow acidless .....lb.	—.11½
Lard Stearine .....lb.	—.15½
Oleo Stearine .....lb.	—.14

Neatsfoot Oil—

Pure .....bbls.-lb.	—.15
Extra .....bbls.-lb.	—.11¼
No. 1 .....bbls.-lb.	—.10¾
Cold pressed .....lb.	—.19½

Fish Oils—

Menhaden Oil

Light pressed .....gal.	–.53
White .....gal.	–.58
Yellow bleached .....gal.	–.56
*Herring, tankcars coast...gal.	–.40
Whale, ext. winter bleached gal	.79–.81
Seal	Nominal

Naval Stores—

Turpentine, N. Y.....gal.	.84
†Turpentine .....gal.	.78
Rosin B. N. Y.....bbl.	5.65
Risin F. N. Y.....bbl.	5.90
Rosin B.† .....bbl.	4.45
Rosin F.† .....bbls.	4.75
Rosin Oil 1st run.....gal.	.40
Rosin Oil 2nd run .....gal.	.46

Pine Tar—

Kiln Burnt .....bbl.	10.50
Retort .....bbl.	10.50

*Nominal.
†Savannah, Ga., market.

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Swift Shipments from

OKLAHOMA

TEXAS LOUISIANA

We make and market all grades of natural gasoline. You can get what you want, right on the dot, when you entrust your order to Akin.

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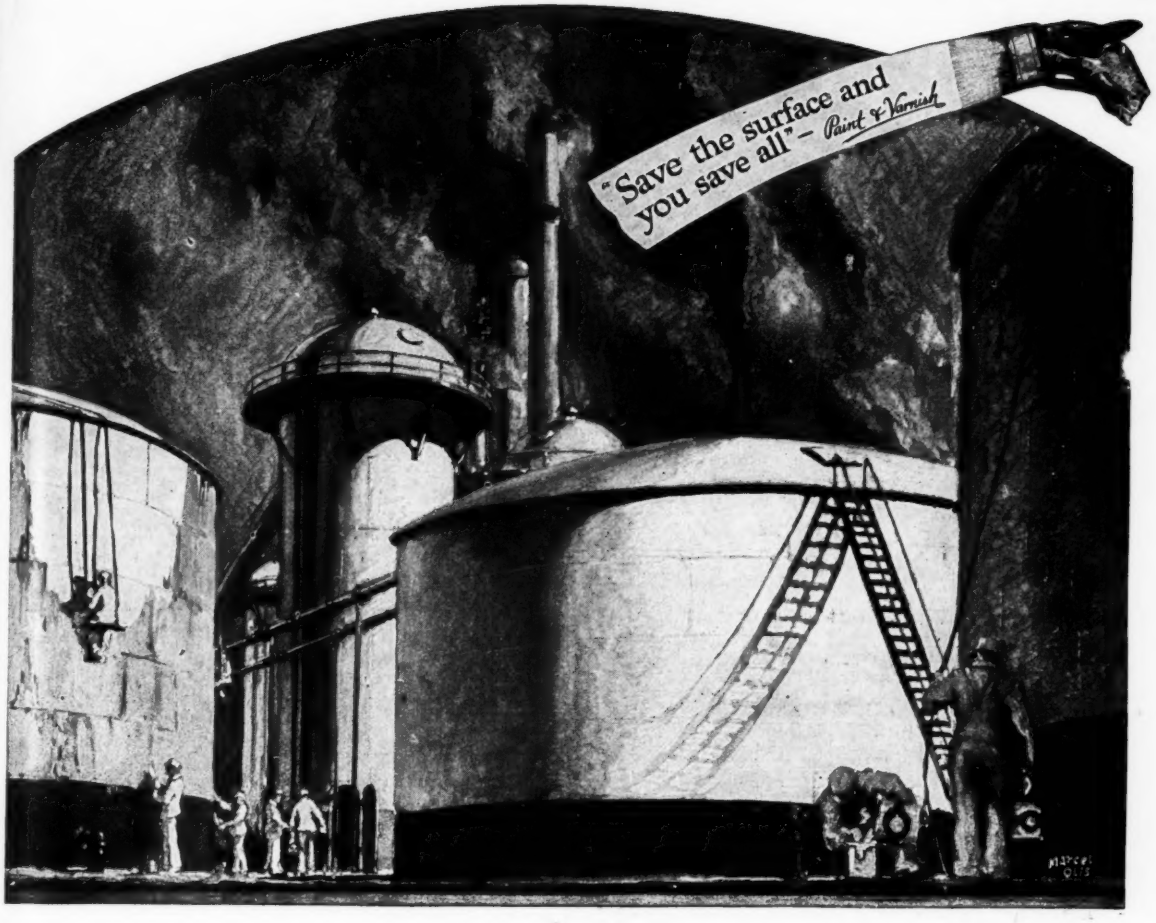


Evaporation Losses *CAN* Be Stopped With Cook's Gas Proof White

The United States Bureau of Mines estimated that 1/30 of the gasoline production of the United States is lost every year from causes which can be prevented.

Improperly painted tanks cause enormous losses by evaporation. These losses can be stopped by painting these tanks with a white paint, such as Cook's Gas Proof White, which will reflect the rays of the sun and cut down the evaporation losses.

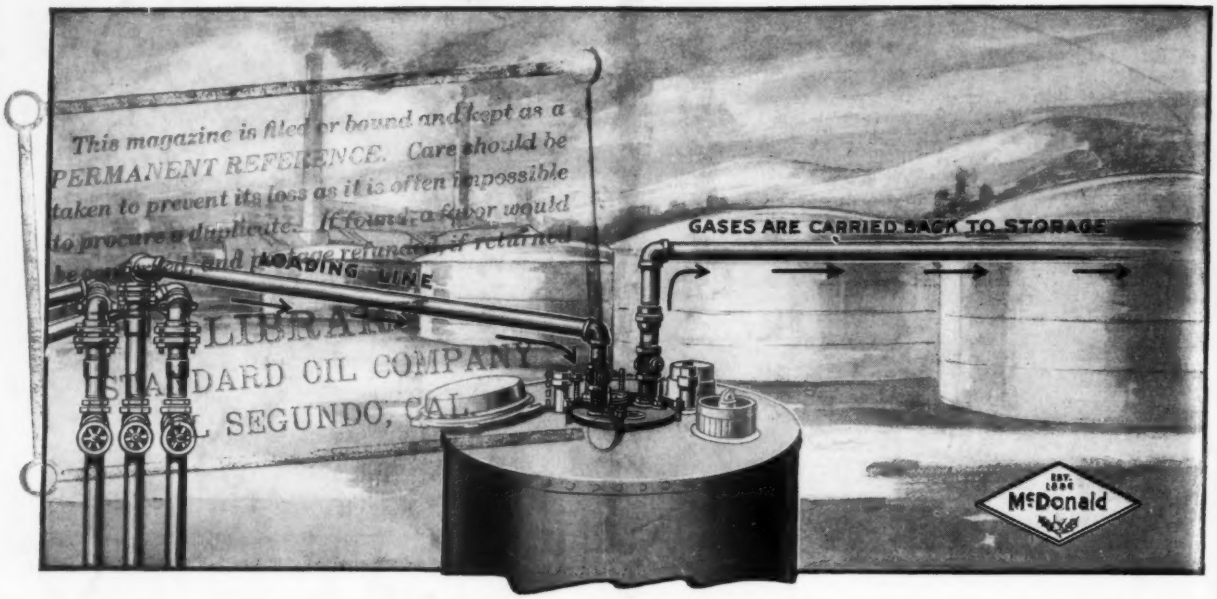
COOK'S Gas Proof White will not discolor. It stays white and will protect your tanks from the sun's rays and from rust and deterioration. This is a proven paint—a paint made up by our chemical engineers to do the very thing for which it is intended: that is,—to prevent evaporation losses—to protect your tanks from rusting—to stay white—and to LAST.

We specialize in the manufacture of paints for the Oil Industry. We have a booklet out describing these paints and color chips, showing the shades in which they are made. If you are interested in better refinery paints, drop us a line and we will mail you this booklet by return mail.

COOK PAINT AND VARNISH COMPANY

Factories: Kansas City, Fort Worth

Branches: Omaha—Wichita—Denver—Dallas—Oklahoma City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to procure a duplicate. If found, a favor would
be conferred and postage refunded if returned
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STANDARD OIL COMPANY
SEGUNDO, CAL.
GASES ARE CARRIED BACK TO STORAGE
McDonald

ONE REFINER SAVED $125,000

In 16 months, with GASTITE Loading— Another Stopped 10% Evaporation Loss

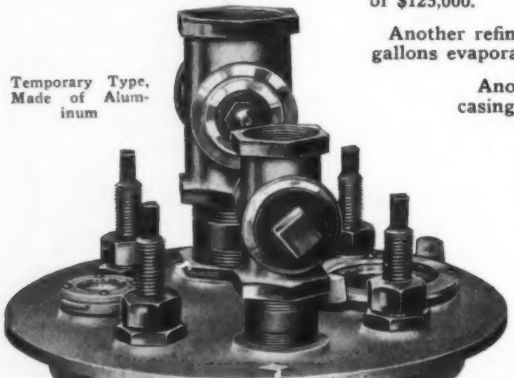
It is almost inconceivable that any refiner today should countenance so tremendous a "leak" in his business as is represented by non-gas-tight loading of gasoline.

Using our GASTITE Dome Cover one refinery, over 16 months, recovered an average of 173 gallons of gasoline per car, or a net saving of $125,000.

Permanent Type, with Cover in Position

Another refiner reported saving from 4 to 5 hundred gallons evaporation on each car loaded.

Another testifies to elimination of evaporation loss when loading casinghead, as high as 10 per cent on hot days.



Temporary Type, Made of Aluminum

Our Universal Gastite Dome Cover should be used for loading casinghead, absorption, blended or straight run gasolines. It will pay its cost many times over in a few days of constant use. Ask for descriptive folder and prices.

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